NEW ZEALAND JOURNAL OF Agriculture

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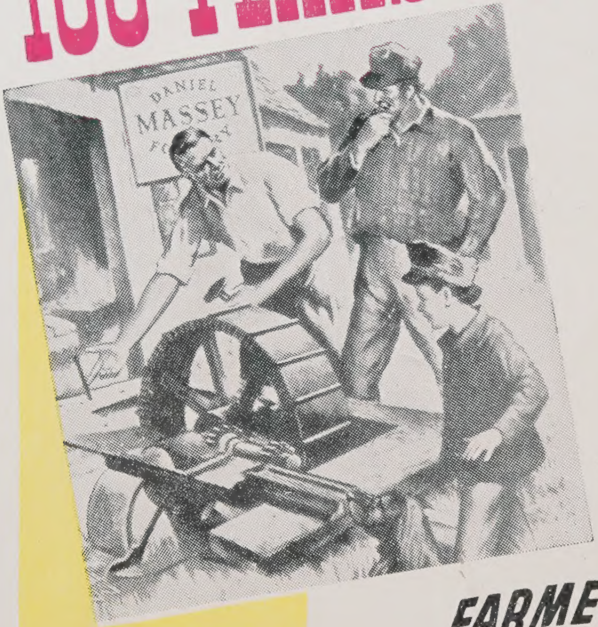

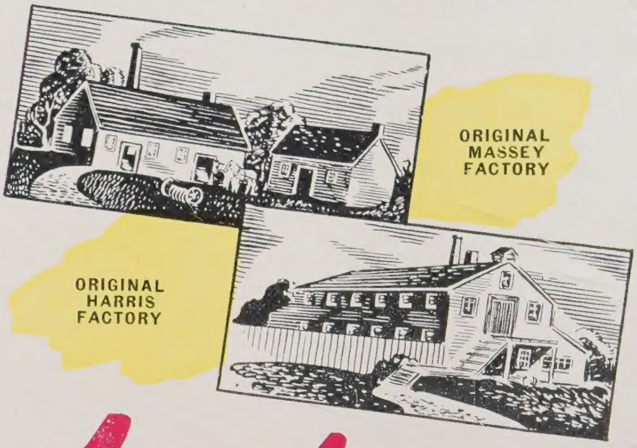

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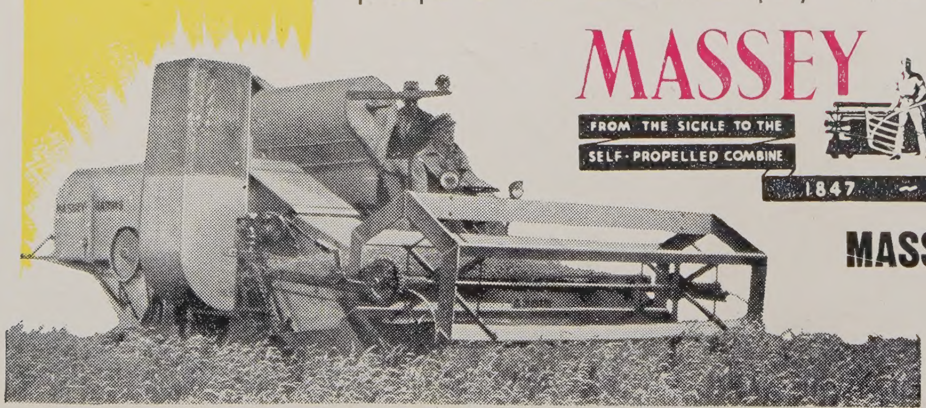

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This month's cover

As 32,000,000 acres, or nearly half New Zealand's total land area, is devoted to sheep farming, the role of sheep in the Dominion's farming economy is of prime importance. Lambing percentages have normally been high, and in 1945 the number of lambs tailed reached the record figure of 19,561,458. In the same year the total number of stud and flock sheep was 33,974,612. In world production of wool New Zealand, although seventh in order in size of actual flocks, is the fourth largest producer and is third in the list of principal exporting countries.

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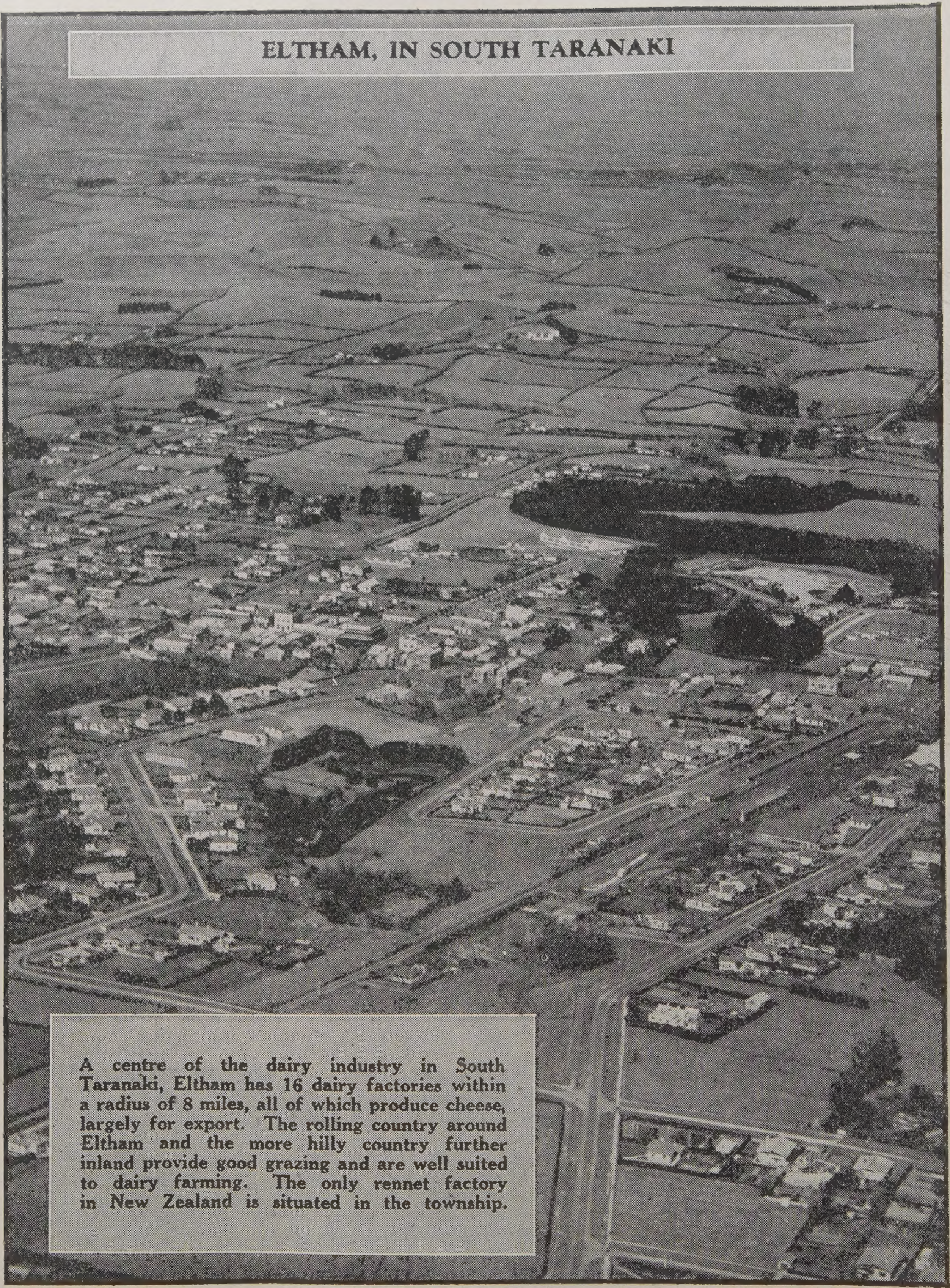
REGISTERED AT THE G.P.O., WELLINGTON, AS A MAGAZINE.

ELTHAM, IN SOUTH TARANAKI



A centre of the dairy industry in South Taranaki, Eltham has 16 dairy factories within a radius of 8 miles, all of which produce cheese, largely for export. The rolling country around Eltham and the more hilly country further inland provide good grazing and are well suited to dairy farming. The only rennet factory in New Zealand is situated in the township.

[V. C. Browne photo.

PRIMARY PRODUCTION PROGRAMME

Aid to Britain Campaign

FARMERS have now had time to study the production programme endorsed by the Aid to Britain Conference called by the Prime Minister to consider how New Zealand can best help Britain in the present exchange crisis. The programme, which has the wholehearted support of primary producers, asks for an expanded effort from all farmers, but one which is within their powers and one which they will readily give. The arable farmer will have to make the fullest use of all the land he can cultivate this season and will have to plan for an expansion of the arable area next season. The dairy farmer and the pastoralist must see that each acre and each animal produce to the maximum during the coming season.

It may be helpful if I now elaborate certain points of the programme. For cash crops the targets are set as follows:—

	Acres	
Wheat	200,000	(extending to 250,000 acres 1948-49)
Barley (malting) ..	50,000	
Barley (feed) ..	15,000	
Maize	12,000	
Potatoes	25,000	
Oats (threshing) ..	60,000	
Tobacco	3,000	(or more, preparing for 4000 acres 1948-49)
Peas	20,000	(possibly up to 45,000 acres if contracts arranged)
Linseed	30,000	

The cereal programme can be accomplished if the fullest use is made of all land now under cultivation or which can be brought under cultivation by the end of September. The Maori people have readily accepted part of the task of increasing the maize area, and their efforts should be supplemented by all pakeha dairy farmers on suitable land in the east coast, Bay of Plenty, and North Auckland districts. If each dairy farmer in these districts grows only an acre or two of maize and uses the produce for pig and poultry feeding, the real aim of the programme will be accomplished. Boys and girls on farms in these districts could well make a maize patch their special effort in helping food production. Let them plant and harvest a crop and feed it to pigs and poultry along with separated milk, and they will then have a part in the general effort of increasing food production.

The target of 20,000 acres for peas is only the absolute minimum likely to be required for export. More peas will undoubtedly be required, and as this crop is normally grown on contract, farmers should accept all contracts offered. The pea acreage may have to be extended to 45,000 acres to fulfil requirements, and advice will be given on this point as information becomes available.

The meat production target is 565,000 tons of all classes or 10,000 tons more than the estimated production for the past season. This I feel can be accomplished with the aid of the increased allocation of fertilisers and with care and attention to the health and feeding of breeding and fattening animals. Every animal which dies through avoidable causes is a direct loss to the food available for Britain.

The pig industry is one which must receive renewed attention. This is not only a matter of present interest, for the marketing of pork and bacon may be of great importance to us in the future. In our own interests alone we must maintain the quality and increase the volume of pig-meat exports. The target set of restoring the breeding sows to 80,000 and producing 44,000 tons of pig meat is one which should be readily attained and a good effort could considerably expand it.

The dairy production target of 190,000 tons of butterfat depends largely for its fulfilment on adequate supplementary feeding, and I feel that I should repeat the recommendation made by the committee responsible for the programme. They stated that it should be possible to reach the target, provided sufficient provision is made for summer, autumn, and winter supplementary feeding, and that it is necessary to provide for each dairy cow from two-thirds of a ton to one ton of hay or its equivalent in silage or fodder crops.

An expanding dairy industry is required and a renewed appeal has been made for the saving of more heifer calves. I am sure all dairy farmers appreciated Mr. Blyde's broadcasts on this matter, and I feel that I should follow up his appeal for more calves with one that all calves reared should be properly fed and carefully weaned. Far too many calves are lost each year through careless feeding and grazing management. Calves are removed from their mothers at a far younger age than other farm animals, and accordingly their feeding must be attended to regularly and carefully. Cleanliness in feeding is essential and next to this comes grazing management. I have already pointed out in these pages that calves should be given the best grazing on the farm and should be grazed rotationally ahead of the dairy herd. Attention to calf rearing and feeding will ensure the quality stock necessary for the expansion of the dairy industry.

As New Zealand is essentially a pastoral country, main lines of production can be expanded only by expanding the pastoral area or by making more intensive use of existing pastures and flocks and herds. This latter method is the only one possible in the present circumstances. It means that each farmer must aim to feed his stock well to secure maximum butterfat and meat production. This, of course, means additional work and care, but I know that farmers fully appreciate the position. It is our duty to help our people in the Homeland.

E. CULLEN,

Minister of Agriculture.

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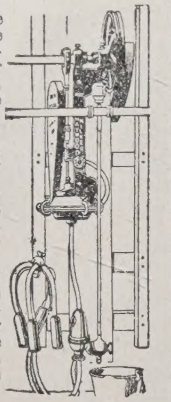

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NITROGENOUS FERTILISERS AND RYEGRASS

Seed Production Stimulated In Manawatu Trials

PASTURE growth in many parts of New Zealand was greatly delayed in the late and cold spring following a mild winter. It is well known that the sickly yellow pasture growth of a late spring can be greatly benefited by the application of nitrogenous manures, and the trial described in this article deals with the seed crop resulting from a late spring application of nitrogenous fertilisers to two crops of ryegrass in the Manawatu. It is pointed out by the author, P. D. Sears, of the Grasslands Division of the Department of Scientific and Industrial Research, that the results secured are not necessarily of general application. They are to be followed up by extensive trials by the Fields Division of the Department of Agriculture.

The short-rotation ryegrass seed crop maturing in the swath ready for the header harvester. The use of nitrogenous fertiliser changed this seed paddock from a low-production and weedy sward to a heavy and clean ryegrass seed producer.

THE successful growing of ryegrass both for feed and for seed crops depends largely on the attainment of a high degree of soil fertility. Normally this is carried out either through full exploitation of clovers, phosphate and lime, and the grazing animal, or through careful soil working and the "natural" build-up by fallowing, etc. Where this has not been carried out to the required amount, however, the judicious use of artificial nitrogenous fertilisers offers a method of good returns from crops of such high value as the new Pedigree ryegrass seed at present being grown.

The trial reported below developed out of a request for advice from a well-known Kairanga farmer, Mr. H. Voss. His property on the main Foxton road at Karere is on good-quality soil, but lies rather wet in winter. Mr. Voss has been a ryegrass seed producer for several years and last year made a start with the growing of the new short-rotation (H1) ryegrass, for which purpose a 20-acre paddock was ploughed out of old grass and sown in March, 1946, with a mixture of Government Stock short-rotation ryegrass and Pedigree white clover. A good strike was secured and satisfactory early growth gave quite a good bite of feed through the winter. In early October, 1946, the paddock was shut for a seed crop, but after a spell of a month the growth of ryegrass was so disappointing and patchy that it was almost decided to abandon any hope of a seed crop, and arrangements were made to graze the paddock off. However, before deciding on this course the farmer obtained an opinion from Mr. Bruce Levy, Director of the Grasslands Division, Department of Scientific and Industrial Research, who was responsible for the breeding of this new grass, as to whether or not anything could be done.

On inspection it was decided that nitrogen deficiency was the trouble. This had been brought about because:—

(a) The very wet soil conditions had resulted in the leaching out of all available soil nitrogen.

(b) The white clover had not developed sufficiently to aid in any soil nitrogen building process; this had probably resulted from the shading effect of the early growth of ryegrass, as well as the wet soil conditions.

(c) There had been an obvious transference of soil fertility from one half of the paddock to the other by the grazing stock. One side of the paddock adjoins the main highway, and the other is bounded by a shelter belt of trees. No doubt the shelter of the trees had acted as a draw to the stock during the cold weather, while the frightening of the stock by the traffic on the road boundary frequently kept them away from that part of the paddock. This transference of fertility was made quite obvious from the growth on the urine patches, which were widely separated near the road and almost contiguous near the far side.

The cold, late spring was also a contributing factor.

Treatments

Mr. Levy's advice was to carry on with the intention to take a seed crop, provided a topdressing of nitrogenous fertiliser was given. He recommended a mixture of 2 parts of sulphate of ammonia and 1 part of superphosphate to be applied at 3cwt. per acre on the weakest areas and at 2cwt. where growth was reasonably good. To counteract any development of soil acidity from the sulphate of ammonia, an application of carbonate of lime equal to at least 1½ times the weight of the former was advised. This programme was followed, the lime being applied at 1 ton per acre.

At the time of fertilising (November 12, 1946) the grass plants had just started to shoot to seed and it was felt that better results would have been secured from a slightly earlier dressing in order to develop more tillering in the grass plants. In between the urine patches the grass plants were very spindly and growth was somewhat prostrate, and there was considerable toad rush, buttercup, and suckling clover present. The white clover plants were quite small and just starting to develop. However, on the urine patches the grass growth was quite vigorous and about 6 to 8in. high, and little weed growth was evident in these clumps.

NITROGENOUS FERTILISERS AND RYEGRASS . . .

At the same time as the short-rotation ryegrass paddock was thus treated an adjoining paddock in a very similar condition and sown at the same time with Pedigree perennial ryegrass and Pedigree white clover was given the same fertiliser treatment. On this paddock, however, the ryegrass was at a more advanced stage of growth and nearly all plants had shot away to seed head. There was also a much stronger growth of white clover, probably because of less competition from this ryegrass in the early growth stages. It was felt at the time that results from fertilising this paddock would not be spectacular because of the advanced stage of seed-head development of the perennial ryegrass.

Experimental Plots

Following a discussion on the most suitable quantity and type of nitrogenous fertilisers for use in grass seed production on this class of land, it was decided to put down a series of experimental plots for measurements. These were set out on an area of 2 acres in the short-rotation ryegrass paddock, and on 1 acre in the perennial ryegrass paddock. Both the areas were uniform in growth and in amounts of urine patchiness. The manuring and harvesting of these plots were carried out at the same time as operations on the paddocks themselves.

The nitrogenous fertilisers used in the trial were as follows:—

	Nitrogen, per cent.
Sulphate of ammonia ..	20
Nitrate of soda	16
Ammonium nitrate ..	35
Ammonium carbonate ..	28
Urea	46

The actual rates of application of the fertilisers are set out in detail in the tables of results, but the general intention of the scheme was to use nitrogenous fertilisers of all the different types available at that time and at rates to give the equivalent nitrogens to those contained in dressings of sulphate of ammonia at 2cwt. and 4cwt. per acre. Superphosphate at 1cwt. per acre was applied throughout, except to the control plots, which received nothing but the lime application. On each paddock the plots were in duplicate, those on the short-rotation ryegrass area being of 1/10 acre each in area and the Pedigree perennial ryegrass plots were each of 1/20 acre. All the fertilisers were applied by hand on November 13, 1946, but to avoid leaf burn the heavy applications were made in two equal dressings, the second one being made on November 20, 1946. Actually heavy rain fell just after each dressing and very little burning effect was noticeable on any plot. Due to a miscalculation urea was applied to the short-rotation ryegrass plots at rates equal to 4½cwt. and 9cwt. per acre instead of the 2cwt. and 4cwt. desired, but as it turned out the results had an added value.

Progress of Trials

The fertiliser effects followed a parallel course in both series of plots, except that the differences were much more pronounced in the short-rotation than in the perennial ryegrass paddock, where the grass was well advanced into seeding stage and also the white clover was stronger at the time of fertilisation. Eventually this white clover became dominant in the perennial ryegrass paddock, and somewhat masked the effect of the added nitrogen on the grass, but in the short-rotation ryegrass area this clover did not cause the same difficulty on any of the plots.

By the middle of December there was a marked difference between the various plots in colour, growth, and botanical composition. On the short-rotation ryegrass paddock the control plots remained a sickly yellow green and the growth was still very stunted. Superphosphate had not given any visible effect. On the nitrogen plots, however, the grass had grown considerably, with the dark green characteristic of this treatment. This was especially pronounced on the plots receiving large quantities, and the urea 9cwt. plots were outstanding in this respect. On these heavy nitrogen plots the grass was starting to lodge. Differences between the types of nitrogenous fertilisers were not very noticeable, except in the case of ammonium carbonate, which did not show the added growth or colour to the same extent. This was no doubt due to loss of nitrogen as ammonia from this manure when it was exposed to the air at the time of application. Also this fertiliser had burnt the tips of the grass leaves a little with the result that these plots had a slight greyish appearance at this stage. There was also a marked difference in the quantity of weed and clover growth between the plots. There was a strong growth of buttercup and suckling clover on areas of the short-rotation paddock which had not received any added ni-

TABLE 1.—YIELDS OF PEDIGREE PERENNIAL RYEGRASS SEED ON PLOTS TREATED WITH DIFFERENT TYPES AND RATES OF FERTILISERS. KARERE 1946-1947 SEASON.
(Average yields of two 1/20 acre plots after dressing to bushel weight of at least 20lb.)

Plot No.	Treatment	Actual quantity per acre of nitrogenous fertiliser	"Dressed" Seed		Pure Seed			Pure Germinating Seed		
			Weight lb. per acre	Relative Yields	Per cent. Purity	Weight lb. per acre	Relative Yields	Per cent. Germination	Weight lb. per acre	Relative Yields
1	Control—no fertiliser ..	Nil	261	100	91	238	100	81	193	100
2	Superphosphate—1cwt. per acre	Nil	274	105	86	236	99	80	189	98
3	Superphosphate — 1cwt. + sulphate of ammonia 2cwt. per acre	2cwt.	418	160	90	378	159	84	318	165
4	Superphosphate — 1cwt. + sulphate of ammonia 4cwt. per acre	4cwt.	510	195	90	461	194	89	410	212
5	Superphosphate — 1cwt. + ammonium carbonate = 2 S/A pa	1.43cwt.	361	138	93	336	141	85	286	148
6	Superphosphate — 1cwt. + nitrate of soda = 4 S/A pa	5cwt.	425	163	91	386	162	93	359	186
7	Superphosphate — 1cwt. + ammonium nitrate = 2 S/A pa	1.14cwt.	423	162	85	360	151	91	328	170
8	Superphosphate — 1cwt. + ammonium nitrate = 4 S/A pa	2.28cwt.	449	172	91	409	172	87	356	184
9	Superphosphate — 1cwt. + urea = 2 S/A pa ..	0.87cwt.	416	159	87	364	153	87	317	164
10	Superphosphate — 1cwt. + urea = 4 S/A pa ..	1.74cwt.	496	190	90	446	187	92	410	212

trogen, but the grass growth was vigorous on the treated areas and was masking the weed growths. This was seen both in the plots and also on the main field area where there had been obvious irregularity in the topdressing, and the growth in the field showed as a series of alternating growths of yellow flowers and of dark green ryegrass herbage. White clover at this stage was not showing up to any degree on this paddock, but in the perennial ryegrass area this clover was developing very strongly and overshadowing any growth of buttercup and suckling clover.

Results of Perennial Ryegrass Trial

By early January, 1947, this growth of white clover had so dominated the whole of the perennial ryegrass paddock that Mr. Voss considered it a better proposition to cut it for hay. This decision was further prompted by the unsettled state of the weather at that time making the drying of such a crop for seed a difficult task, which called for much labour not then available on the farm. However, it was decided to cut the plots and endeavour to harvest the seed by hand methods. On all the plots at this time the herbage was a tangled mass of grass and clover, the grass having lodged on all plots, and having been more or less buried under the top hamper of clover. As the clover was still growing vigorously, it was difficult to decide on the best time of cutting to get the optimum yield of seed together with being able to dry the herbage for threshing, which is a very important consideration in most grass seed crops in the Manawatu area except in very favourable seasons.

It was decided to cut on January 14 with a tractor mower fitted with a high-speed cutting attachment—a valuable aid in cutting through the tangled growth of clover and grass. After two days of poor drying conditions the swaths were put up into small cocks to lift the mass off the wet ground and to get the best value from air drying. These cocks were turned twice in the next 4 days, and on January 20 and 21 they were threshed with hand flails on canvas sheets. Handling of the crop naturally caused loss of seed on all plots, but this did not appear to be unduly excessive, and also there appeared to be a greater loss on the plots with the higher yields, so that the results obtained are conservative and still valid for examination. It was quite noticeable that the plots without added nitrogen dried out much more slowly and were much more difficult to handle than the others.

The threshed seed and straw were then put over the threshing mill at the Grasslands Division, and samples obtained from this for cleaning on a small seed-dressing machine. Dressing was carried out to give a minimum bushel weight of 20lb. The yields of dressed seed per acre for each treatment were then obtained by calculation back through the sample and total field weights. Samples of each line of seed were submitted to the Seed-testing Station for official test. The final seed yields are set out in detail in Table 1, the figures given being the average yields of the duplicate plots in the series. There are considerable differences in the yields of dressed seed, the addition of nitrogen giving an increase of between 40 per cent. and 90 per cent., while the addition of superphosphate alone did not effect any increase. With the exception of ammonium carbonate there was not much difference between the forms of fertilisers, except that both the high urea and sulphate of ammonia plots seemed to show to slight advantage. The yields as a whole are, of course, low, but considered in relation to the controls, the increase would certainly be profitable at current seed and fertiliser costs.

There is no great difference between the purity of the lines, but this is because the white clover suppressed most of the weed growth and did not contribute much seed. However, there is a definite tendency for the germinations of seed from the nitrogen-treated plots to be higher than those of seed from the control and superphosphate only areas. Examination of the seed in the laboratory showed that the losses of germination were coincident with blind seed disease infection, but whether the lowered infection in the nitrogen plots was due to protection from the fungus spores by the lodging of the grass seed heads, times of flowering, or to a greater vigour of the plants themselves could not be decided.

However, considering the results as a whole the net result of the treatments in terms of yield of pure germinating seed was to give an increase of approximately 100 per cent. for a dressing of 4cwt., and approximately 75 per cent. for a 2cwt. dressing of sulphate of ammonia, or its equivalent in the other forms of quick-acting nitrogenous fertilisers, except ammonium carbonate, which was somewhat lower in value.

Results of Short-rotation Ryegrass Trial

On the short-rotation ryegrass plots the results were much more clearly defined because of a much better balance between grass and clover and greater total yields of grass seed on the nitrogen plots.

The differences in growth and colour observed between the treatments continued right up to the time of harvesting of the plots. At the middle of January, when the perennial ryegrass plots were cut, the short-rotation series were, as a whole, grass dominant, with a small amount of clover showing in the bottom. This was much more pronounced in the control plots, where the suckling clover was very much in evidence. On the superphosphate plots there was a strong growth of white clover, but the grass was still topping the sward, while there was a general gradation in grass growth up to that in the high-urea plot, where there was a solid mass of lodged ryegrass with white clover just showing through. On the main field area there was a similar variation in growth due to the unevenness of distribution of fertilisers.

There was a considerable variation in times of flowering and seed ripen-

AID TO BRITAIN COMMITTEE

Increased Production the Main Aim

THE utmost effort of citizens of New Zealand in aiding Britain in her present grave crisis was pledged by representatives of all important national organisations at the Aid for Britain conference recently called by the Prime Minister. A permanent Helping Britain Committee which was set up was given the conference's mandate to work out ways and means of achieving the general plan laid down by the conference.

Main emphasis of the conference's recommendations was placed on most effective use of the resources of the Dominion toward maximum production both for export and satisfaction of essential consumer goods in New Zealand. To this end greater efficiency in transport, the expediting of the manufacture and delivery of fertilisers on to farms, and greater availability of farm machinery are urged, and incentives will be directed toward giving encouragement to the production of essential commodities. An intensive campaign for increased primary production is being undertaken, and means of conserving dollar exchange, including voluntary cuts in petrol consumption and newsprint, will be advocated.

The very representative nature of the permanent committee is evident in its personnel, which is as follows: Mr. F. P. Walsh (chairman), Mr. H. E. Blyde (Federated Farmers), Mr. W. J. Truscott (Manufacturers' Federation), Mr. D. A. Robertson (shipping interests), Mr. Haskell Anderson (Associated Chambers of Commerce), Mr. R. Eddy (N.Z. Workers' Union), Mr. G. Kilpatrick (Freezing Workers' Union), Mr. F. Crook (Miners' Union), and Mr. K. McL. Baxter (Federation of Labour).

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Bulletin No. 267

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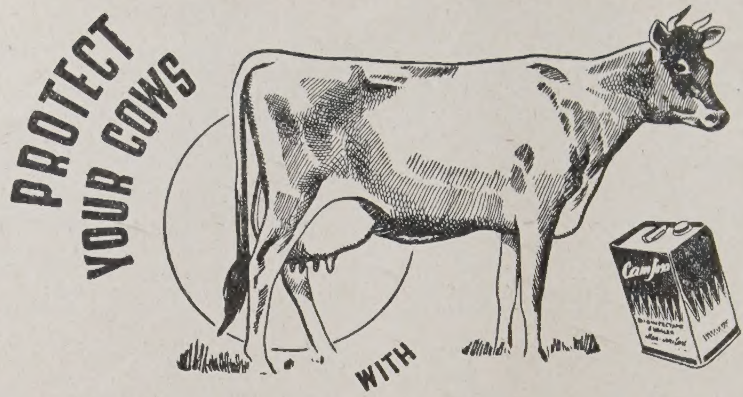

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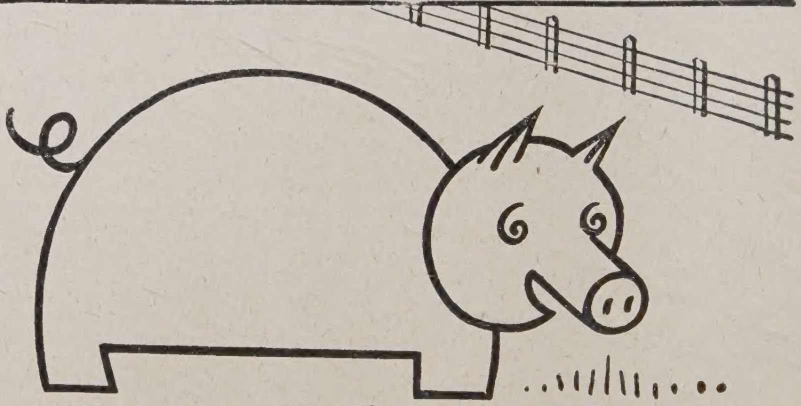

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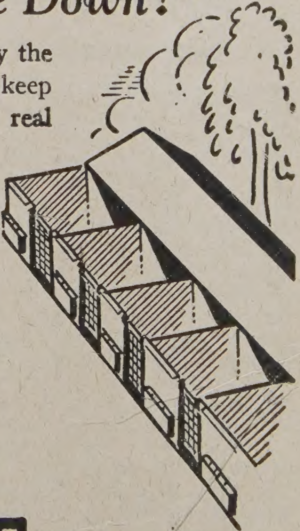

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ing between the plots, and also in the main paddock. The addition of nitrogen delayed flowering by several days. The 2cwt. plots were about 2 days behind the control plots, while there was a further delay of another 5 days to the plots receiving 4cwt. dressings. This naturally caused some confusion in the cutting of the main paddock, where similar differences were apparent. After much discussion this paddock area was cut on January 26 and 27 and threshed by a header on February 3 and 4 following a very good spell of drying weather. The final yield of dressed seed was approximately 750lb. per acre for this main paddock area.

The early-maturing series of plots (the nil and low nitrogen) were cut on January 25 and the later ones on January 30. Threshing was carried out by hand flails after gathering straight from the swath on to canvas sheets, after 5 days' good drying weather in both groups of plots. It was again quite noticeable in the field operations that on the areas which did not receive the added nitrogen the drying process was not so rapid, due to the tangled mass of clover in the sward. Also this clover continued to grow vigorously after cutting while the herbage was lying on the field. It appeared quite obvious that had the weather not been so favourable for rapid drying of the cut material, the growth of white clover would have developed very rapidly and caused considerable difficulty in harvesting, especially on the areas which had not received added nitrogen and where the clover content was greater. This is quite a usual occurrence in the Manawatu and in itself is a strong point for considering the use of nitrogenous fertilisers as a means of producing a clean, harvestable crop of grass seed.

Seed dressing was carried out to the same standard as for the perennial ryegrass crops and samples were submitted for similar testing and examination by the Seed-testing Station. The yields obtained from the treatments on these plots are set out in Table 2, which shows the average per acre yields of the duplicated plots in the series.

The differences in yield follow a similar course to those in the perennial ryegrass series, but the range of yields and qualities is much greater throughout. Considering the yields of dressed seed, there was an increase of approximately 175 per cent. from the heavy nitrogen dressings, except those of ammonium carbonate, which were much less effective. For the 2cwt. dressings there was an increase of 75 per cent., while the superphosphate alone made little difference in yield. It is of interest to note that the 9cwt. urea plots did not give a yield in excess of the 4½cwt. plots, showing that the extra amount was of no value to the plants for seed production, and that the 4½cwt. dressing was apparently very near to the optimum requirement in this case. When the yields are reduced to a pure seed basis the differences are shown in even greater relief. As the control and superphosphate plots contained a large amount of clover, both suckling and white, seed from these two plants constituted a large proportion of the "dressed" seed yields. On the other hand the purity of the seed from the heavy nitrogen plots was high, as was to be expected from their appearance, while the lightly-fertilised plots occupied an intermediate position.

There is a somewhat similar, though less pronounced, difference in the germination percentage figures. Again the heavy nitrogen plots showed definitely better germinations than the light dressings and the nil treatments. This is noticeable in all the treatments except the ammonium carbonate, but, except for the sulphate of ammonia treatment, the lighter dressings do not show a gradation in germination power between the extremes of heavy and light. Detailed examination of the non-germinating seed in the laboratory showed that there was only a very light infection of blind seed disease (1 per cent.) and this was confined to the no-manure plots. The other seeds failing to germinate had, for the most part, the appearance of being immature, but a few had simply degenerated to a pulpy mass.

It is, however, a matter of considerable interest that the application of relatively large amounts of artificial or "forcing" nitrogen did not impair the germination power of the much heavier crops harvested, but on the other hand had a beneficial effect in both paddocks, although perhaps for different reasons. This is in direct contrast to opinions widely held

TABLE 2.—YIELDS OF PEDIGREE SHORT-ROTATION RYEGRASS SEED ON PLOTS TREATED WITH DIFFERENT TYPES AND RATES OF FERTILISERS. KARERE 1946-1947 SEASON.

(Average yields of two 1/10 acre plots after dressing to a minimum bushel weight of 20lb.)

Plot No.	Treatment	Actual quantity per acre of nitrogenous fertiliser	"Dressed" Seed		Pure Seed			Pure Germinating Seed		
			Weight lb. per acre	Relative Yields	Per cent. Purity	Weight lb. per acre	Relative Yields	Per cent. Germination	Weight lb. per acre	Relative Yields
1	Control—no fertiliser ..	Nil	399	100	52	208	100	80	166	100
2	Superphosphate—1cwt. per acre	Nil	395	99	56	221	106	82	181	109
3	Superphosphate — 1cwt. + sulphate of ammonia 2cwt. per acre	2cwt.	754	189	79	598	287	85	508	326
4	Superphosphate — 1cwt. + sulphate of ammonia 4cwt. per acre	4cwt.	1093	274	92	1007	484	89	896	540
5	Superphosphate — 1cwt. + ammonium carbonate = 2 S/A pa	1.43cwt.	469	118	75	351	169	81	284	171
6	Superphosphate — 1cwt. + ammonium carbonate = 4 S/A pa	2.86cwt.	468	117	82	383	184	79	303	183
7	Superphosphate — 1cwt. + ammonium nitrate = 2 S/A pa	1.14cwt.	646	162	78	501	241	80	401	242
8	Superphosphate — 1cwt. + ammonium nitrate = 4 S/A pa	2.28cwt.	1106	277	93	1030	495	90	927	558
9	Superphosphate — 1cwt. + urea = 4½ S/A pa ..	2cwt.	1176	295	96	1123	540	90	1011	609
10	Superphosphate — 1cwt + urea = 9 S/A pa ..	4cwt.	1141	286	95	1078	518	89	959	578

NITROGENOUS FERTILISERS AND RYEGRASS . . .

by some seed growers in this country, who have refrained from using artificial nitrogen largely because of their fear of impairment of seed quality.

However, the major consideration from the seed growers' point of view is that in this particular trial under the conditions as set out the use of certain quick-acting nitrogenous fertilisers resulted in an increase in pure germinating seed of over 400 per cent. for the applications equivalent to 4cwt. of sulphate of ammonia, and about 200 per cent. for the 2cwt. dressings. The comparative ineffectiveness of ammonium carbonate and also the very small return from superphosphate alone are clearly seen. In addition to the increased seed yields, the value of the fertiliser in producing a crop much easier to handle in the field was clearly demonstrated. In considering the results of the trial, however, one should bear in mind that the particular conditions were such as to lead to striking results being secured from the nitrogenous fertilisers. Also, in the use of such artificials it is of importance to keep in mind the possibility of permanent injury to the clover content of the sward. So far there do not appear to have been any deleterious effects, and both in the main field areas and in the plots there is now a vigorous growth of white clover and grass, without any noticeable differences between the treatments. Conditions for clover growth on this particular soil and in the late part of this season have been very good, however, and the paddocks also received a generous dressing of lime to neutralise any possible toxic effects of the nitrogenous fertilisers used.

Photograph by E. Bruce Levy.

NEW SCHEDULE OF SEED CERTIFICATION FEES

A NEW system of seed certification fees as outlined below is being introduced by the Department of Agriculture to take effect in the 1947-48 season.

Whereas in the past fees have been payable at time of the grower's application for certification, while further fees have been payable on sealing and tagging of the machine-dressed product, in future fees will in general be payable only when the certification procedure has been completed. Such fees will be collected by medium of monthly accounts with recognised mercantile firms or alternatively by payment to the local officer at the time of completion of the certification operation.

It has not been possible to amend the fees covering potato certification to conform to the general procedure, and growers will still be required to pay a fee before inspection of their crops. The initial fee accompanying the application for certification is discontinued, however.

Late entry fees will still be payable by growers whose applications for certification are received after the closing date specified for a crop.

Blending fees are payable where seed which has been finally certified is later blended under the supervision of a Departmental officer.

Splitting fees are payable where seed which has been finally certified is later divided into different-sized packages under Departmental supervision.

The usual fees for any purity and germination certificates and for any laboratory strain tests will be made in addition to the appropriate certification fee.

Variety of Seed	Certification Fees (payable on seed finally sealed and tagged)	Blending Fees (payable on lines blended after having been finally sealed and tagged)	Splitting Fees (payable on lines split after having been finally sealed and tagged) N.B.—Minimum fee of 2/6 for any one visit entailing splitting of lines of Certified seed.
A.—FOR SEEDS CERTIFIED ON FIELD INSPECTION			
Perennial ryegrass Short-rotation ryegrass Italian ryegrass	3d. per bushel (20lb.) or part	1½d. per bushel (20lb.) or part	¾d. per bushel (20lb.) or part
Cocksfoot Timothy *Phalaris tuberosa*	1½d. per 10lb. or part	¾d. per 10lb. or part	⅜d. per 10lb. or part
Browntop White clover Red clover (Montgomery) Cowgrass Subterranean clover	3d. per 10lb. or part	1½d. per 10lb. or part	¾d. per 10lb. or part
Wheat Oats Barley Lupins	1d. per bushel or part	½d. per bushel or part	¼d. per bushel or part
Onion seed	2d. per lb.	1d. per lb.	½d. per lb.
Rape Kale Chou moellier Turnip Swede Mangel	1-14lb. containers 1d. each 15-28lb. containers 2d. each Over 28lb. containers 3d. each	½d. each 1d. each 1½d. each	¼d. each ½d. each ¾d. each
B.—FOR SEEDS CERTIFIED ON LABORATORY TEST ALONE			
Perennial ryegrass	2d. per bushel (20lb.) or part	1½d. per bushel (20lb.) or part	¾d. per bushel (20lb.) or part
White clover	2d. per 10lb. or part	1½d. per 10lb. or part	¾d. per 10lb. or part

C.—SEED POTATOES

Fees are payable before field inspection is undertaken.

All varieties: 7/6 per acre or part.

Note: 1. If total area is rejected on field inspection, all fees in excess of 7/6 will be refunded.
2. If portion of area is rejected on field inspection, all fees paid on rejected portion will be refunded.

D.—LATE-ENTRY FEES

A late-entry fee of 10/- (covering all entries of any one crop) is payable by the grower in respect of any application for certification received and accepted by the Department after the closing date fixed for the particular crop.

J. H. CLARIDGE, Agronomist.

NORTH ISLAND PIG CARCASS COMPETITION

By A. LONGWILL, *Assistant Superintendent of the Pig Industry, Wellington.*

CLAIMED to have been the largest pig carcass competition held in any country, this year's Tomoana porker and baconer competition, the fifth of a series, attracted entries of 4196 pig carcasses from producers in the whole of the North Island. The high quality of the entries was indicated by the fact that the total prize money of £1000 was divided among more than 100 competitors.

The senior judges of the competition. From left: Messrs. C. H. M. Sorensen, J. D. Anderson, and T. Marks. Points for balance of side are assessed by taking the measurement as shown and relating it to the internal body length measurement.

THE North Island championships, which concluded the competition, were held on July 7 at the works of the Westfield Freezing Co. Ltd., Auckland. The seven district competitions, each of which covered a District Pig Council area, were held at Tomoana freezing works on June 30, Patea freezing works on July 3, and Westfield on July 7, and the main prize winners of these competitions competed for the North Island championships.

Before the war the sponsors, Messrs. W. and R. Fletcher (N.Z.) Ltd., conducted competitions in co-operation with District Pig Councils in the Auckland Province with the aim of stimulating the producer's interest in the production of high-quality carcasses and providing as much information as possible at field days held at the conclusion of the competitions. The basis of the competition has been gradually altered. During the war the aim was to encourage increased production of baconers into the winter months to meet a wartime demand, but more recently equal importance has been attached to both baconers and porkers to conform with market requirements.

In this year's competition entries had to be submitted by February 28 and all pigs had to arrive at the works by June 22. Judging was carried out on the day before the field day held at each works. Competitors were required to state on their entry form the breeding of their pigs, the age of the pigs as at February 28, and particulars of feeds used, including dairy by-products, home-grown crops or grass, and concentrates. Some interesting information was obtained, but owing to inadequate information on age in many cases and the fact that feeding particulars were not given on a quantitative basis, the information available about entries is insufficient to enable useful comparisons to be made.

Each entry consisted of four carcasses of pigs selected by the entrant from a line not exceeding six when the entry was made. Any farmer could enter two teams of porkers and two of baconers. With a prize of £50 for the North Island champion team in each class, £35 for the best combined team, £20 for the first and £10 for the second district prizes, and young farmers' clubs' special prizes, it would have been possible for a Y.F.C. member to have won £280 out of the total £1000 prize money.

System of Judging

Each individual pig was judged on the system laid down by the judging standards committee appointed by the National Pig Industry Council. In addition, 10 points per team were allotted for evenness of weight and a further 10 points for evenness of conformation.

The following is a summary of the points system for baconers:

	Maximum points per pig	Maximum points per team
Measurement		
Body length	20	80
Shoulder fat	10	40
Loin fat	20	80
Balance and depth of side	10	40
Eye Appraisal		
Hams	15	60
Fore-end	10	40
Fullness of meat ..	10	40
Marketing points ..	5	20
Team Points		
Evenness of weight ..	—	10
Evenness of conformation	—	10
Totals	100	420

In view of the greater importance of attractive appearance in porkers, the maximum for marketing points for them was raised to 10. Suitability of weight for normal trade requirements was taken into consideration under marketing points, and a penalty exacted where any of the team fell outside the desirable weight ranges of 71 to 90lb. for porkers and 131 to 160lb. for baconers.

Any of the following faults in one or more carcasses disqualified the team from winning other than a consolation prize:

Rejection or condemnation of a pig in part or whole by normal meat inspection and grading practice;

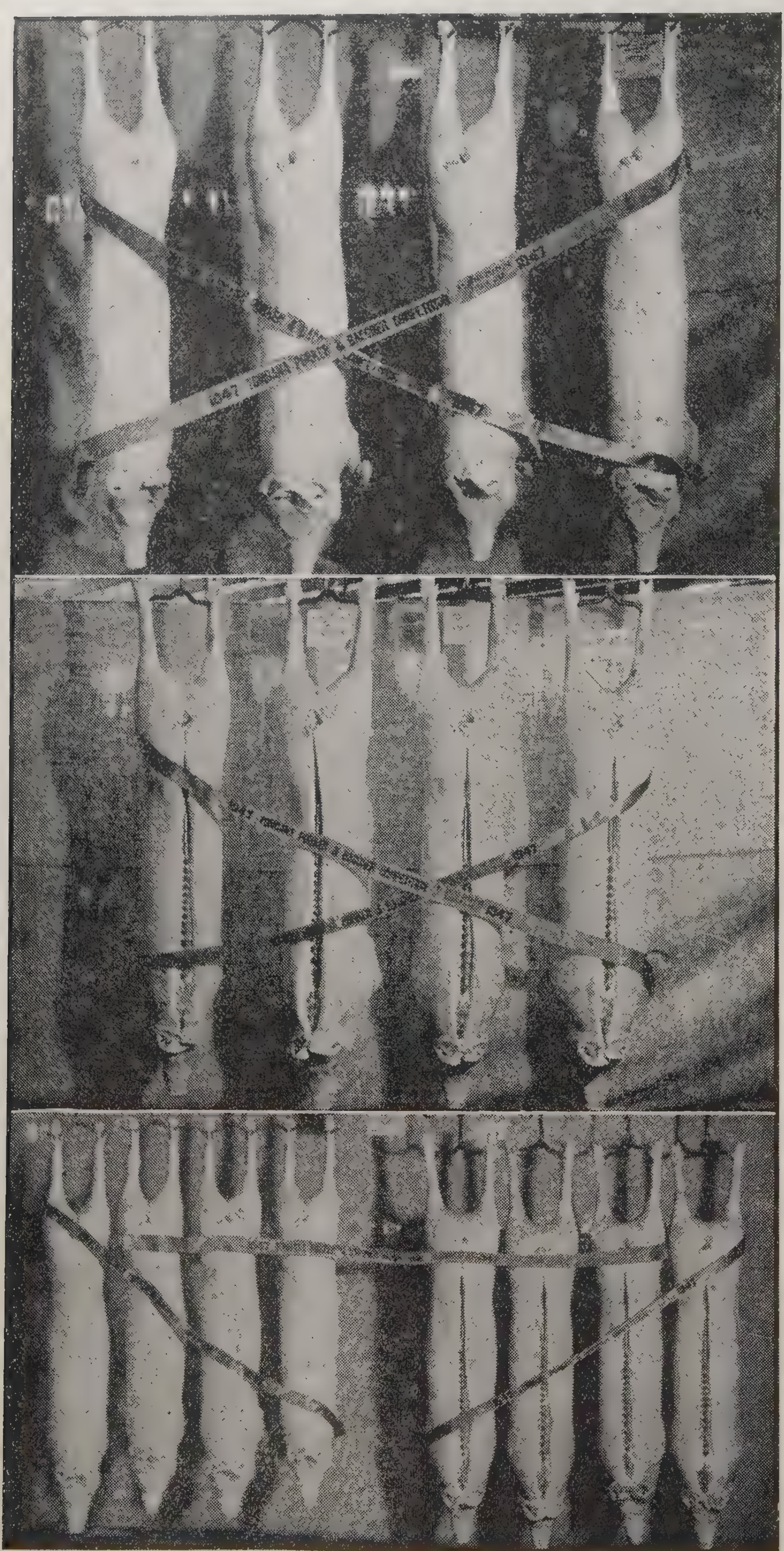
Excessively-soft or discoloured fat, and

Extensive seedy cut.

The judging of the 4196 pigs assembled at the three works was carried out by Messrs. J. D. Anderson, T. Marks, and C. H. M. Sorensen, with whom were associated officers of the Department of Agriculture and the N.Z. Meat Producers' Board. Members of the works' grading and clerical staffs helped with the measuring of all carcasses, totalling of points, and making out of score cards.

Those present at the judging included District Pig Council Supervisors and others interested in the trade. All agreed that the system of judging correctly sorted out the most desirable teams, and that little time was required to check over the points

NORTH ISLAND CHAMPIONSHIP WINNERS



Upper left—Mr. N. A. Fraser's team of purebred Large Whites, winners of the porker class. Middle left—Mr. J. B. Logan's purebred Large Whites, winners of the baconer class. Lower left—Mr. J. G. Fowell's winning combined team.

of the high scoring teams at the end to decide final placings.

Two hundred of the carcasses, including the main prize winners, are to be sent to London, where they will be examined and reported on at Smithfield by specialists in the United Kingdom trade. The pigs from last year's competition were shown at Smithfield in the first display of its kind since the war. The judges' commendations were gratifying and indicated that they considered the Dominion had made progress in carcass-quality improvement during the war. Continued efforts, however, are necessary to maintain improvement, particularly in increasing length for weight, reducing depth of side in relation to length, and reducing backfat at the shoulder in all but the very best of pigs. New Zealand baconers also show too much backfat at the loin, but the Dominion's pigs compare favourably with those of other countries regarding fullness of meat. In efforts to improve length and balance of side care must be exercised to maintain improvement of ham, for although this is not generally weak, there is room for improvement, and considerable care will be needed to effect this while selection is made for improvement of length and less deep fore-end.

Winners of Main Prizes

Main prize winners of district competitions were as follows:—

PORKERS (Maximum Points 440)

	Breed	Points	Place
Northland—			
N. A. Fraser, Kawakawa	L.W.	347	1
F. D. Miller, Warkworth	B.	329	2
Auckland—			
R. F. Morgan, Pukekohe	L.W.x	338	1
S. N. Jamieson, Mauku	L.W.x	335½	2
Waikato—			
R. A. Raymond, Otorohanga ..	L.W. x B.	338	1
J. A. W. Telfer, Otorohanga ..	L.W.	335	2
Bay of Plenty—			
J. E. Black, Whakatane	L.W.	327½	1
W. Twyman, Ngakura	L.W.	327	2
Tairawhiti—			
Mahora Stud Farm, Hastings ..	L.W.	322	1
N. Webby, R.D. Otane	T.xB.	316	2
Taranaki—			
W. Davis, Waverley	T.xB.	335	1
K. W. Jackson, Inglewood ..	T.xB.	334	2
Wellington—			
Levin Co-op. Dairy Company ..	L.W.xT.	346	1
H. and N. Myers, Mauriceville ..	L.W.	337	2

NORTH ISLAND PIG CARCASS COMPETITION

D. M. Smith, of the Animal Research Station, Ruakura, lecturing at the Westfield field day on "Breeding and Feeding for Pork or Bacon."

BACONERS (Maximum Points 420)

	Breed	Points	Place
Northland—			
J. B. Logan, Kamo	L.W.	340	1
J. Middleton, Whangarei ..	L.W.xT.B.	338	2
Auckland—			
W. G. Bell, Ardmore	L.W.	339	1
A. H. Irwin, Puni	L.W.	330	2
Waikato—			
C. A. McLean, Te Kawa	L.W.x	336	1
K. P. Hodgson, Hairini	L.W.x	326	2
Bay of Plenty—			
H. Craig, Reporoa	L.W.x	311	1
W. Matthewson, Ngakura ..	T.	306	2
Tairawhiti—			
W. Clarke, Hexton	L.W.	307	1
Mt. St. Mary's Mission, Greenmeadows	B.x	295	2
Taranaki—			
W. M. Allen, Pihama	D.J.xL.B.	319	1
B. Bourlee, Jnr., Patea	L.B.xT.	315	2
Wellington—			
Est. W. M. Hartley, Te Rehunga ..	T.xB.	335	1
W. Brown, Umutaoroa	T.xB.	334	2

The grand championship prizes were won by Mr. J. B. Logan (baconers) and Mr. N. A. Fraser (porkers). Mr. J. G. Fowell, R.D. Howick, won the championship for combined teams, his Large White baconer entry being third and his Large White-Berkshire cross porker entry being fourth in their classes in the Auckland district section. The total points secured by the two teams were 659.

Mr. R. F. Morgan's team won the Y.F.C. grand championship for porkers, and a team of Large Whites entered by Mr. D. Reid, Port Albert, won the Y.F.C. baconer grand championship and was fourth in the Northland district section with 333 points.

The success of the Large White breed or crosses resulting from matings with Large White sires is noticeable in the prize-winning entries. Although there were not as many Large White or Large White crosses as there were Tamworths, Berkshires, or their crosses in the total entries, strains capable of giving excellent carcass results proved more prominent in the Large White than in any other breed. In the 62 teams which scored 320 total points or more and for which particulars of breeding are available the various breeds contributed to the breeding as follows, each parent of the team counting as one unit, and a cross parent as half a unit:—

Large White	58½
Berkshire	31
Tamworth	27½
Large Black	3
Duroc Jersey	2
Crossbred	2
Total parent units ..	124

Challenge to Breeder and Producer

The breeding of the teams was commented on by Dr. C. P. McMeekan at the Westfield field day. Dr. McMeekan considered that a more extensive use of a White breed was essential if New Zealand were to compete successfully on the Home market in the future. In this fact lay a challenge both to the breeder to select the strains of Large White most suitable for New Zealand conditions and to the commercial pig producer to provide the housing, feed supply, and general management which would enable full use to be made of the improved strains of pigs.

It is perhaps significant to note that the increasing use of the Large White in this country has paralleled the growth of adequate piggery accommodation of a more permanent kind. Farmers who have been keen enough to provide the facilities and management to enable any breed of pig to give of its best are the ones who most frequently become Large White enthusiasts. They claim for the breed not only superior carcass performance, but more economic food conversion. These points still have to be proved, however, under conditions in New Zealand. The way was pointed to breeders by the late Mr. H. E. Johnson, whose insistence on commercial quality in his pure strain has borne consistent fruit. This particular strain won the major honours in the baconer class in all the previous Tomoana competitions, and won again this year, when it was entered by Mr. J. B. Logan.

The Berkshire has undoubtedly helped to build the Dominion's reputation for fullness of meat, particularly in porkers. Selected strains crossed with selected Large Whites make a very desirable cross for commercial purposes either for pork or bacon.

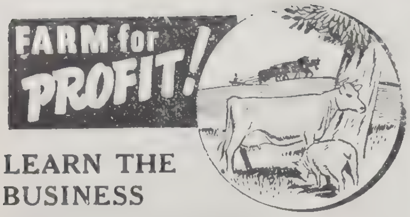
Field Days

Much interest was shown by the many farmers who attended the field days, where all the entries were on display. About 1800 farmers took advantage of the opportunity presented by these field days to learn how to correct faults in their pigs, how to produce an article of the highest quality for the trade, and to see how pigs were handled and the by-products prepared at the freezing works. The attendance at Tomoana was about 350, at Patea about 450, and at Westfield about 1000.

Short talks on various subjects touching on the judging system, prevention of disease in pigs, pig production in Britain and Denmark, and the future outlook for New Zealand pig meats on the Home market were given at the three field days, and at Patea a very interesting demonstration of boning out beef and veal was given. The exhibits of by-products of the meat works and the products of the cannery also attracted considerable attention at each works.

The Minister of Agriculture, Mr. E. L. Cullen, attended the final day at Westfield and congratulated the sponsors on their initiative, which was the means of sustaining a live interest in pig production and also served to help advertise the quality of New Zealand pig meats in Britain. He congratulated the farmers, who had responded excellently. Although there had been a decline in production during the war, it was not as great as might have been expected, and quality had been maintained. He hoped that the stage was now set for a rapid recovery in quantity so that the Dominion would be assured a fully competitive position on the Home market.

All photographs in this article by Sparrow Industrial Pictures Ltd.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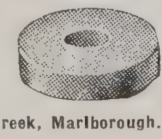

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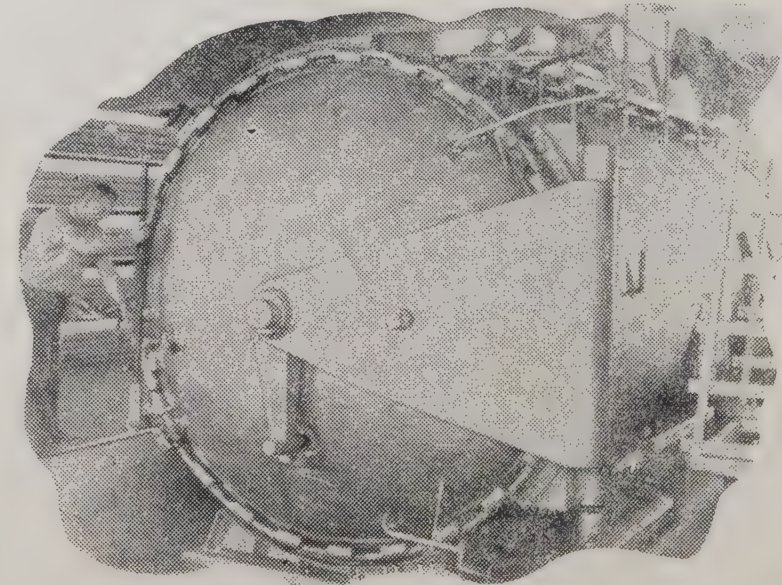

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THE HOME GARDEN IN OCTOBER

By A. G. KENNELLY, *Instructor in Vegetable Culture, Christchurch.*

OCTOBER is a busy month for the home gardener. The sowing of seed for winter vegetable supplies should not be overlooked; brussels sprouts, leeks, curly kale, savoy cabbage, and broccoli (winter cauliflower) can be sown. Main crop potatoes should be planted, though in the south frost is a danger until mid-November, and for plantings made early in the month caution should still be exercised. Successional sowings of salad vegetables should be attended to and toward the end of the month in most central and northern districts it is safe to sow half-hardy subjects such as dwarf and runner beans, melon, pumpkin, marrow, squash, cucumber, and sweet corn, and to plant out tomato and egg plant.

EARLIER-SOWN crops such as silver beet, lettuce, and root crops may require thinning. The hoe should be kept going and any necessary support given to peas or beans as described in last month's notes. Spray materials should be checked over and fresh supplies obtained if needed. Areas which were dug earlier and left exposed to the weather can be lightly forked over ready for use.

Asparagus Beds

Established beds of asparagus will benefit from a weekly application of either organic liquid manure or nitrate of soda 1 to 2oz. to 4 gallons of water. The spears should be cut 2 to 3in. below soil level, and it is not advisable to cut for more than about seven or eight weeks each season.

Beans, Dwarf and Climbing

In the North Island an early sowing of either dwarf or climbing beans may be made from the middle of the month onward, according to locality. Whether climbing (runner) or dwarf beans are chosen will depend mainly on the amount of space available. If properly grown, climbing beans yield more heavily than the dwarfs, and the newer stringless varieties are not inferior in flavour and quality. The runners, particularly the older varieties, are also considered slightly hardier than the dwarfs and usually bear for a longer period. They may be grown in rows without staking by slashing off or pinching back excessively-long growths, but in good soil the best results are obtained if vines are staked or allowed to climb a fence or trellis. Dwarf beans, on the other hand, have the advantage of requiring only a very moderate amount of space for development and of reaching maturity in a shorter time.

Beans can be grown on a wide range of soils, but a well-drained, easily-worked loam of good humus content is probably the most satisfactory. Clay soils are not suitable and low-lying situations should be drained or the plants will become yellow in wet weather. Beans are very susceptible to frost and can be grown successfully only during the warm period of the year, as cold weather or extreme changes in temperature adversely affect the pollination of the flowers and of course the subsequent setting of the crop. Dryness at the roots is also a frequent cause of the non-setting of the flowers, and it is partly for this reason that sandy soils or soils containing very little humus should be avoided, unless a supply of moisture can be assured. If either a cold snap or exceptionally hot or dry conditions are experienced later the young pods may curl or hook or even wither and die.

The soil should be well worked before sowing, and though it need not be more than moderately rich in available organic material and nitrogen, the addition of superphosphate to most soils has been found almost indispensable. Recent Australian trials in which various plots were given potash (in the form of sulphate of potash), nitrogen (in the form of sulphate of ammonia), and phosphoric acid (in the form of superphosphate) confirm this. Yields from plots receiving nitrogen or potash alone or in combination were very poor; results were outstanding where superphosphate alone was applied, and though the yield was not

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THE HOME GARDEN IN OCTOBER

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Turnip-rooted beetroot is popular for table use. The crop does well in soil that has been heavily dressed with organic manure for a previous crop.

increased by the application of sulphate of ammonia with the superphosphate, the quality of the beans on all the soils on which the trials were carried out was improved. Superphosphate either alone or in a mixture containing 25 per cent. by weight of sulphate of ammonia can be applied at the rate of 10 to 14oz. to 7 yards of row. This can be dug in before sowing, or if it is hoed lightly into the surface after sowing, watering afterward should not be neglected.

If it is intended to support runner beans, a double row of arched 8ft. stakes is satisfactory, or they can be supported by wires (in a fence system) with strings or pea sticks running vertically from the wires. A third method is to use groups of 3 or 4 stakes 8ft. or longer placed firmly in the ground 18 to 24in. apart and inclining toward each other so that they can be tied at a point near the top.

Beans in rows can be sown 2 to 3in. deep (according to whether the soil is heavy or light) at the bottom of a shallow trench about 2in. deep. The seed should be sown 3in. apart and the plants thinned to about 6in. apart. Double rows should be 7 to 20in. apart and 2 to 4ft. from other vegetables.

Good varieties are:—**Climbing** (runners)—Scarlet Runner, Emperor, Epicure, Fardenlosa, Market Wonder. The last two can be specially recommended for haricots. **Dwarf**—The Prince, Tender Green, Burpees Stringless, Green-Pod, Woods Centenary (a golden-podded variety). Where the diseases anthracnose and bacterial wilt are troublesome it is advisable to sow either runners, which are all resistant, or the following varieties of dwarfs, which are highly resistant: Burnley selection of Canadian Wonder (not ordinary Canadian Wonder) and Pale Dun. Black Prince (syn. Valentine Black), Blue Pod, and Woods Centenary (syn. Speckled Butter and Stringless Kidney Wax) are less resistant. As disease is often carried in seed, it should be saved only from a clean crop.

Beetroot

Beetroot can be grown in almost any kind of soil of reasonable humus content provided it is well drained and is not lacking in lime. There are three main sorts of beetroot—long red, globe, and turnip-rooted—each of which has its particular value. The turnip-rooted kind is probably preferred for table use, but the globe and long varieties give a higher yield and often "stand" better in dry conditions. Like most root crops, beetroot does well in soil that has been heavily dressed with organic manure for a previous crop. Blood and bone mixed with twice its weight of superphosphate and broadcast at the rate of 3oz. a square yard with a good dressing of wood ashes and well worked into the top soil before sowing the seed will give satisfactory results.

Some good varieties are Derwent Globe, Darkest Globe, Obelisk (or Intermediate), and Maori King (long shape).

The seed should be sown ½in. deep in rows 12 to 15in. apart and later thinned 2 to 5in. apart in the rows; 1oz. of seed will sow 100ft. of row.

Cabbage and Cauliflower

Sturdy cabbage and cauliflower plants grown from seed sown earlier can be set out 18 to 24in. apart in the rows, with the rows 24 to 36in. apart. Though good crops can be grown on light soil, the best results are obtained from a heavy, well-drained loam rich in organic matter. If a mixture of one part sulphate of ammonia, three parts superphosphate, and half part sulphate of potash (all by weight) is distributed at the rate of ½lb. to each 9ft. along shallow furrows in which the plants are set out, they should get a good start. Two subsequent dressings of nitrate of soda or sulphate of ammonia at the rate of ½ to 1oz. a square yard broadcast and lightly hoed in over the root area may be necessary if development appears slow.

Carrots

Culture of the carrot, one of the most important vegetables in the home garden, should not be overlooked. Carrots do well in any but dry soils and provide health-giving fresh food for most of the year. There is no urgency yet to sow the main crop, and where the depredations of the carrot rust fly are severe, infestation may be minimised by sowing main crop seed in November or December.

A sowing of an early variety should be made as soon as the soil can be

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Radio Broadcasts

RADIO talks to farmers will be given from Station 1YA Auckland at 7.15 p.m. on the following dates:—

October 6—"Current Farming Problems," by C. R. Taylor, Fields Instructor, Rotorua, and E. R. Marryatt, Fields Instructor, Whakatane.

October 13—"Pig Production—Where It is Going," by D. M. Smith, Research Officer, Animal Research Station, Ruakura.

October 20—"October on the Farm," by G. A. Blake, Instructor in Agriculture, Matamata.

October 27—Young Farmers' Clubs session, by a representative of the Taumarunui district Y.F.C. committee.

Farm news sessions are broadcast over main national stations every Thursday at 9.20 p.m.

got into suitable condition, and where seed has already been sown successional sowings should be attended to. Carrots do well in a soil that has been heavily manured for a previous crop; soils that are thought to be lacking in fertilising elements will benefit from the broadcasting of superphosphate at 2oz. a square yard after digging. Dry wood ashes can also be broadcast over the soil and raked in before sowing the seed. If the soil is inclined to "set," some radish seed may be mixed with the carrot seed before sowing so that the quicker-growing and more vigorous radish seedlings, the seed of which germinates more quickly, will assist in breaking any crust that may form. The radish may be harvested at a fairly early stage of growth, or, if not wanted, they can be destroyed by cutting just below the collar with a sharp knife. Except in heavy soils which consolidate and so prevent expansion, carrots rarely need thinning if sown correctly, but they may be thinned to 3 to 4in. apart and the thinnings used for soups and stews. Sow thinly ½in. deep in rows 12 to 15in. apart. A quarter of an ounce of seed will sow 100ft. of row. Good varieties are Chantenay, Early Krop, Manchester Table, James Intermediate, and Champion Scarlet Horn (early).

Celeriac or Turnip-rooted Celery

Celeriac belongs to the celery family and may be used either for salads or cooked like other root crops. It has a turnip-like root with a flavour of celery. Culture, too, is somewhat similar, but as it is not blanched and is less exacting in its requirements than celery, it deserves to be grown more extensively in the home garden. Seed can be sown in rows 12 to 27in. apart in late September or early October and seedlings later thinned 6 to 9in. apart in the rows. It should be given plenty of water during the growing season and any side shoots that develop on the bulb should be removed.

Cucumbers

Though cucumbers can be grown with varying success in more sheltered districts all over New Zealand, large-scale production is mostly confined to the north. In districts subject to early and late frosts production is very uncertain. The soil for early sowing should be of an open nature, warm, aerated, and well drained. A light, sandy loam is best. It has been found, too, that virgin soils, being rich in organic matter, are particularly well suited to early production. For main crops heavier soils usually give a higher yield over a longer period than light soils. Soils deficient in organic matter should be enriched some time before sowing by digging in a green crop or applying stable manure or compost.

Seed is usually sown ½ to 1in. deep in a row of "hills" 42 to 60in. apart. Six to eight seeds are sown in each hill and when seedlings are about 2in. high they are thinned so that only 3 or 4 of the strongest are left. A hill is made by incorporating a heavy dressing of organic material such as compost or stable or farmyard manure in the soil. To prevent the roots drying out quickly and to facilitate watering the hill should not rise above the level of the surrounding ground. A ¼lb. mixture of 4 parts blood and bone and 1 part superphosphate well worked into the soil around each hill before planting is a suitable fertiliser. When the fruit is swelling a weekly application of weak liquid animal manure will help the plants. To encourage the development of lateral growth and assist early fruiting the tips of the vines should be "pinched" out when they are about 24 to 30in. long.

Good varieties of cucumber are Stockwood Ridge, Early Fortune, Davis Perfect, and Crystal Apple.

Egg Plant

In especially-favoured districts the egg plant is best sown directly in its permanent position; elsewhere it should be planted out in early summer when danger of frost is over. Except under nearly ideal conditions, it does not transplant readily. It requires a frost-free period of 3 to 5 months to mature its entire crop, and production is therefore mainly confined to northern districts, where treatment is similar to that of the tomato. The fruit should, however, be thinned if a fine sample is required.

Planting distances vary from 4ft. x 2ft. to 4ft. x 4ft., and a warm, sunny, well-drained situation should be chosen.

Kohl-rabi or Turnip-rooted Cabbage

Kohl-rabi combines the flavour of both the cabbage and turnip. It is grown for the bulbous root like a turnip which forms above the ground. To secure tender bulbs it should be grown quickly. If it is allowed to reach maturity it becomes tough and stringy, and it should not therefore be allowed to grow beyond 2½ to 3½in. in diameter. The soil should be well drained and very rich in humus, and for most soils a mixture of 2 parts blood and bone and one part superphosphate at the rate of 3 to 4oz. a square yard will be found beneficial. Seedlings may be transplanted, but it is customary to sow the seed ½in. deep in rows 12 to 15in. apart and later to thin the plants to 6 to 8in. in the rows. The roots should not be allowed to become dry, as this causes a bitter flavour. It is very hardy, and though it is primarily regarded as a cool-weather plant, it usually does quite well from an October sowing.

Marrow, Pumpkin, Squash, Melon

Early crops of marrow, pumpkin, squash, and melon can be obtained in districts subject to late frost if a sowing is made early in the month under glass. A frame placed in a warm sunny situation can be used, and if fresh horse manure is available, it is a good plan to make a hot-bed by placing it to a depth of 10 to 15in. on the floor of the frame. If necessary the soil can be excavated to make room for the manure; this also helps to conserve the heat. If seed is to be sown in boxes placed in the frame, the manure need be covered only by sufficient soil to ensure hygiene, but where it is intended to sow seed directly into the frame it is advisable, so that the soil retains its moisture and provides root room, to have 4 to 6in. on top of the manure. The young plants can be more conveniently handled and hardened off if the seed is sown in boxes.

So many home gardeners have the erroneous idea that the making of a hot-bed is just a simple matter of placing a heap or layer of manure or similar organic material in position and waiting until it heats that it is as well to explain that the use of just any manure, stack bottom, etc., will not do. To be certain that it will heat, the material must have just the correct moisture content and it must not be too old. Heating is brought about by fermentation due to microbial activity, and as the environmental factors, together with that state of the material which induces microbial activity, are sometimes difficult to arrive at and to control, the making of hot-beds with any other material than horse manure is rarely undertaken. Fresh horse manure that is not too wet heats up quickly and holds its heat well. The fresh manure should be turned twice or three times in the course of a few days, and when it is in a uniform state of fermentation it can be forked into the frame. A light sprinkling of leaves incorporated in it will steady the heat. The manure should be trodden firm, and provided it is not allowed to get wet, the covering can be left off for the first few days until the temperature, which should not exceed 90 degrees F. for seed frames and boxes, becomes steady. If the frame is in a warm, sunny situation, it need not be made of glass—any covering that excludes frost and prevents the manure from getting too wet will do; but to retain the heat and exclude draught, the sides should be made of wood or other substantial material. If scrim is used for the covering, it should be rolled back for a maximum period consistent with reasonable warmth each day. A glass frame need not at first be opened more than a couple of inches during the day to give ventilation; but when the seed-

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lings have nearly reached the stage for planting out the glass should be left off entirely, except at night.

In the open ground the seed or young plants can be set out on "hills" prepared as described in last month's notes.

Varieties recommended are:—

Pumpkin.—Queensland Blue and Triamble.

Squash.—Red Warren (early) and Golden Hubbard and Green Hubbard (main crop).

Marrow.—Long White Bush and Long Green Bush.

Melon.—Ice Cream and Black Spanish (water melon) and Hale's Best (musk or rock melon). Except in specially-favoured situations, melons are not recommended for southern districts.

Kumaras

For best results the kumara (sweet potato) requires a long season of growth, and in the South Island (except in northernmost districts) they can rarely be grown satisfactorily. Plants for setting out when danger of frost is over are usually obtained by starting old tubers into growth in a warm frame, and when the rooted shoots are a few inches long planting them a few inches apart in light, free, moderately-rich soil in seed-boxes or trays placed in frames, or in a sheltered situation, to develop further. Rooted cuttings from tubers started into growth in early September should be ready for setting out in early November. Most home gardeners prefer to buy rooted cuttings, which are usually available at planting time from seedsmen or nurserymen in districts where kumaras can be grown.

The kumara bed should be in a warm, sheltered situation, and a light, sandy, well-drained loam is best. The application of farmyard or stable manure to the land immediately before planting is not recommended; land that was heavily manured for a previous crop is excellent.

Fertiliser for kumaras is similar to that for potatoes. Three parts superphosphate mixed with one part sulphate of ammonia and in some soils one part sulphate of potash may with advantage be added. The fertiliser should be measured by weight and applied at the rate of about 6 to 8oz. for 5 yards of row, depending on the amount of organic manure already in the soil. The fertiliser should be well worked into the soil before setting out the plants.

Planting can be done on the flat, but for best results where there is no danger of the soil drying out it is best done on broad low ridges, which have the advantage of warming quickly and making digging easier. The rooted cuttings or "slips" are usually set out 18in. apart with the rows 24 to 30in. apart, and, except in showery weather, it is best to water them in. They should not be set deeply, as digging is then more difficult; the rooted portion is best planted in the form of a very shallow U. After-cultivation should always be shallow and is confined to weed destruction and an occasional raising of the vines with the hoe or foot to prevent rooting at the nodes.

Lettuce

Though lettuce is primarily a cool-weather vegetable, modern methods of plant breeding have produced varieties that have shown a remarkable adaptation to hot, dry weather. This is a particularly favourable development, as it is in the warmer weather that lettuce is so popular as a salad vegetable. Lettuce is an excellent source of vitamins B_1 and B_2, as well as calcium and iron, and it contains some vitamin C. Because it is eaten raw it loses none of its food value during preparation for the table, and its low energy value makes it desirable in low-calorie diets.

The varieties of lettuce may be divided into five general classes, each of which differs somewhat in its adaptation to the many conditions under which lettuce is grown. The classes are:—

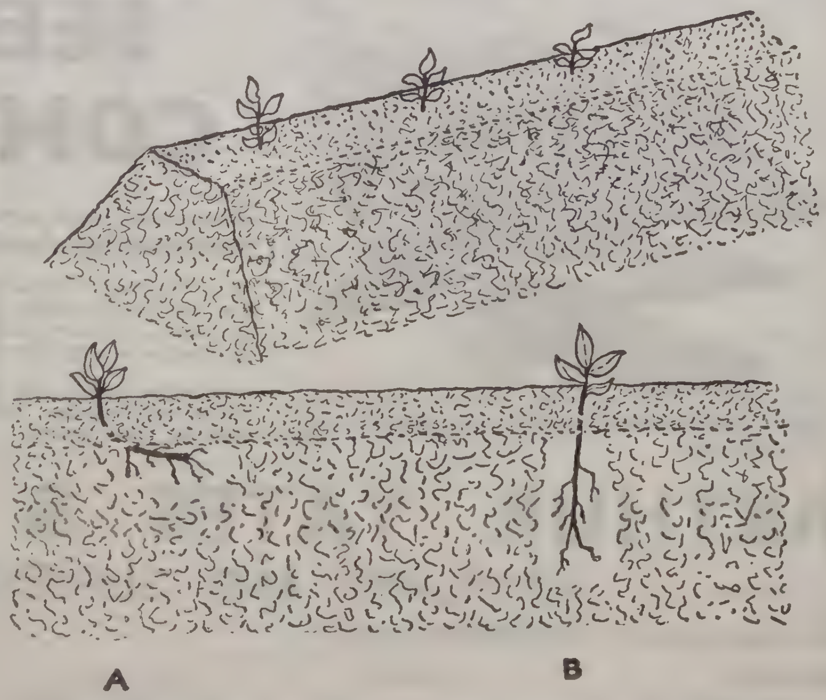
1. **The butterhead type,** which is distinguished by its soft heads, the inner leaves of which feel buttery or smooth and oily. The leaf edges are not usually frilled or indented. Varieties: All The Year Round and Tom Thumb.

2. **The crisphead type,** which is distinguished by its crisp texture and firmness of head. The leaves are frilled or crinkled. This is the lettuce which is now mainly grown by commercial growers, and much work has been done on different varieties of the type to breed and select new strains for disease resistance, quality, and adaptation to varying conditions. Some important varieties of the type are New York or Webb's Wonderful, the Imperial strains, Iceberg, and Neapolitan.

3. **The cos or romaine type,** which is distinguished by its upright habit of growth, elongated heads, and stiff leaves. It is considered by some to be the best of all types in quality. The leaves, though somewhat coarse, are usually sweet and of good quality. In Europe they have long been popular, but they are rarely seen even in home gardens in New Zealand. Some varieties are Cos White and Champion Cos Eclipse.

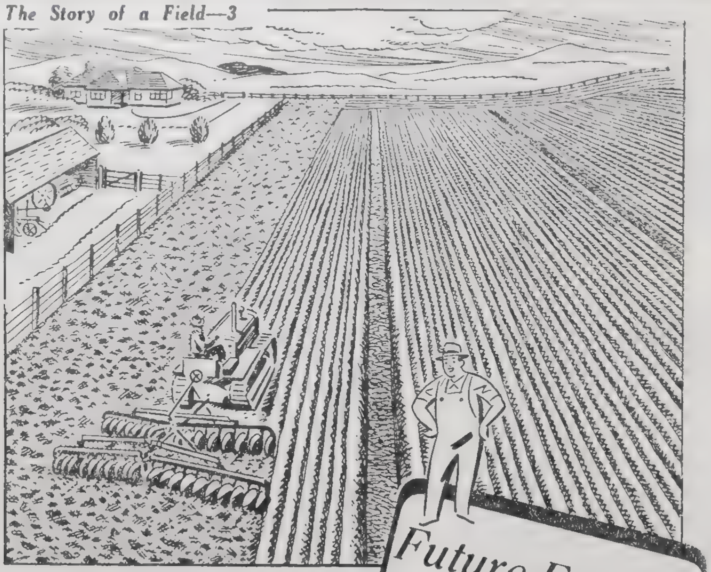
4: **The leaf or bunching type,** which is rarely seen even in home gardens in

KUMARA PLANTING



Upper—Rooted kumara cuttings set out 18in. apart on broad low ridges slightly flattened to assist retention of moisture. Lower—A, correct method of planting, in the form of a shallow U. B, wrong method, which causes the tubers to be formed too low, making digging more difficult.

The Story of a Field—3



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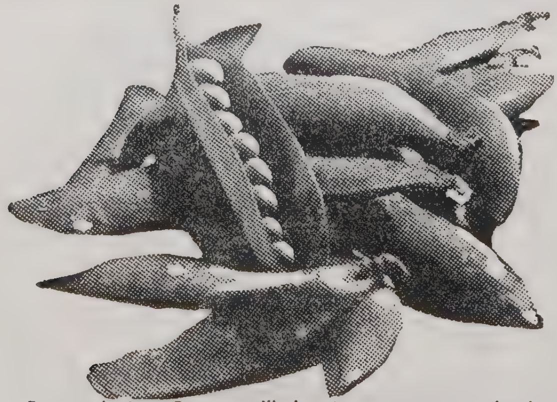

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New Zealand. It is characterised by its loose frilled or crinkled non-head-forming leaves. It can be grown in areas where the temperature is too high for successful production of other kinds of lettuce, and it is better adapted for growing under glass than most other varieties. Varieties are Grand Rapids and Bronze Beauty.

5. **The stem type**, which is distinguished by its large stem and rosette of green leaves at the top. The leaves may be used when young, but they are not as palatable as those of the other types. It is chiefly grown for its stalk, which is peeled and eaten raw or cooked. The only variety of this type noticed in New Zealand catalogues is Celtuce, which when cooked has a mild, pleasing flavour suggestive of celery and asparagus and zucchini.

Though sandy loams are preferred for early crops, good lettuce can be produced on almost any type of soil that is rich in humus, except a very heavy clay. In most soils the digging in some time before sowing of organic material such as green crops, compost, or well-rotted manure is almost essential for consistently-good crops. Stable manure should not be turned into the soil immediately before setting out the plants. Quick growth is essential to the production of crisp, tender heads, and if growth is slow the plants will be tough and have a bitter taste. A quick-acting fertiliser such as blood and bone broadcast at the rate of ¼lb. a square yard after digging and before planting should give satisfactory results. After the plants have commenced to heart, nitrate of soda applied between the rows—it should not touch the foliage—at the rate of 1oz. a square yard and hoed in will ensure continued growth. Weekly applications of liquid animal manure may be substituted for the nitrate of soda.

Seed can be sown thinly ¼in. deep in rows 12in. apart every 3 or 4 weeks, and, except in hot, dry weather, when transplanting is difficult and the plants are better thinned, they can be set out 9in. apart in rows 12in. apart.

Numerous good varieties are described in seedsmen's catalogues, and the selection of a variety suited to summer conditions is easily made. Good examples of this type are Imperial 847 and Great Lakes.

Onions

In most districts of the South Island it is customary to sow main crop onions in September. If this has not yet been done, a sowing made early in October usually gives almost as good results. Onions are gross feeders and respond well to good cultivation and liberal, though balanced, manuring. Weed growth should be kept down by shallow hoeing between the rows and by the removal of weeds in the rows by hand or by a small tool especially made for the work. Such a tool can be easily made by heating and bending an old knife blade or by bending and sharpening an edge of a piece of heavy-gauge sheet iron as shown in the diagram.

Onions should be sown ½in. deep in rows 12in. apart in well-drained, finely-cultivated soil that has been adequately firmed. If the soil is heavy or of a nature that is inclined to restrict development, or if large onions are required, the onions can be thinned to 3 to 4in. apart in the rows. Small onions or onions that have been supplied with only limited quantities of nitrogenous manure are usually the best keepers.

For good keeping and long storage Pukekohe Longkeeper and Turbot are recommended. Other good, high-yielding varieties for more immediate use are Ailsa Craig, Straw Spanish, and Odourless.

Parsnips

In the south it is advisable to sow the main parsnip crop without further delay, but in the north sowings may be made in November or even December. Parsnips are primarily a crop for late autumn or winter use, but they must be sown sufficiently early to enable them to reach full development before growth slows or stops in late autumn. The seed loses its vitality fairly quickly; even one-year-old seed has a germination of only about 65 per cent.

Parsnips do well in soil that was heavily manured for a previous crop. Superphosphate broadcast at the rate of 2oz. a square yard will benefit the crop, and if available dry wood ash may be broadcast over the soil and raked in before sowing the seed. Sow the seed ½in. deep in rows 12 to 27in. apart in soil that has been worked down to a fine, even tilth. The seedlings should be later thinned 4 to 6in. apart in the rows. If the plants are first thinned to only an inch or two apart, the final thinnings can be used in soups or stews. Half an ounce of seed will sow 100ft. of row. There are several good varieties listed in most seedsmen's catalogues. Hollow Crown is recommended.

Peas

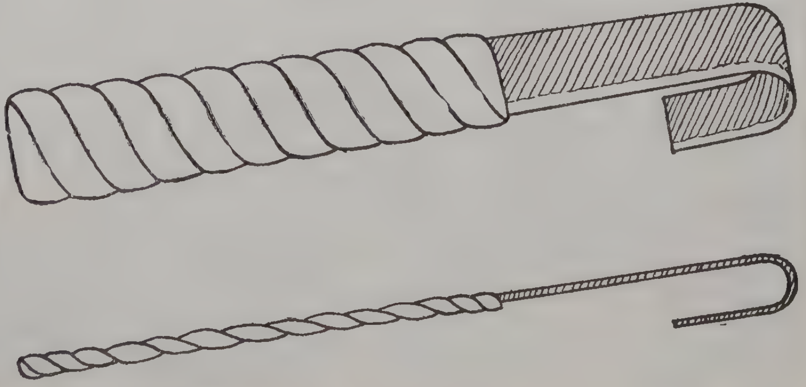
Due to the relatively-short season of harvesting, it is important to sow peas to ensure continuity of supply. This may be done either by sowing at about the same time several varieties having different maturity periods, or by making regular fortnightly or three-weekly sowings of nearly similar varieties.

Peas grow best in reasonably-cool climatic conditions, and prefer a moist, well-drained loam with a high humus content. Except in warm districts or in soil that is likely to dry out, they do well if sown in October. A dressing of 2 to 3oz. of superphosphate to the square yard worked into the ground before sowing will be beneficial. They are best sown 1 to 2in. deep and about 2 to 3in. apart in the bottom of a shallow trench, and if they are later earthed up, only the tall or intermediate varieties will require staking. A pound of seed is sufficient to sow about 100ft. of row. The following have been especially popular with home gardeners: W. F. Massey (early), Greenfeast, Richard Seddon, and Stratagem.

Potatoes

Early potatoes should be kept earthed up and all weeds removed. In the north spraying with Bordeaux will provide a good insurance against blight. Though caution should still be

HOME-MADE WEEDER AND THINNER FOR ONIONS AND CARROTS



An old knife blade or a sheet of heavy-gauge sheet iron 9 to 12in. long and ½in. to ¾in. wide makes a good weeder and thinner for onions and carrots. The material should be heated and bent and an edge sharpened, and the handle bound with string or cloth.

exercised for plantings made early in the month in districts subject to late frosts, the planting of the main crop can generally be proceeded with. Potatoes that have been greened and sprouted are at least a fortnight earlier than others. They are then actually **growing plants**, usually with miniature leaves on the shoots, and it is not therefore advisable to plant them too deeply.

The potato requires a well-drained soil rich in humus. Virgin soil or soil heavily manured for a previous crop is suitable; grass clippings or a green crop dug in before planting will provide humus. Lime is very rarely necessary. An artificial fertiliser mixture of 3 parts superphosphate and 1 part sulphate of ammonia may be applied at 6 to 12oz. to 6 yards of row, or equal parts of superphosphate and blood and bone can be used. Either cut or whole tubers may be planted 10 to 16in. apart in a trench 4 to 5in. deep, the greater distance for the main crop varieties. Fertiliser may be dusted along the trench.

Varieties recommended are: Epicure (first early), Arran Banner (very good early which, if left, will produce a heavier crop than Epicure), Aucklander Short Top (standard main crop white variety), Dakota and King Edward (main crop varieties that are favoured in certain localities when conditions appear to suit them), and Inverness Favourite (a white variety which matures rather later but generally gives a heavier yield than Aucklander Short Top).

Rhubarb

Rhubarb should be kept cultivated and free from weeds. The pulling of the stalks is exhausting to the plants, and except in the richest soils they will benefit from a weekly application of liquid manure. When harvesting, the stalks should be grasped near the base and pulled with a twisting motion so that they break cleanly and cause only a minimum amount of injury to the crown.

Salsify or Vegetable Oyster

The distinctive flavour of salsify has led to its being sometimes called the oyster plant or vegetable oyster. It is grown largely for autumn and winter use, and its culture is similar to that of the parsnip. It can be sown thinly in October or November in rows 12 to 15in. apart and later thinned to 4 to 6in. in the rows. It is well worth growing in gardens having sufficient space.

Seed Sowing

Seed of cabbage and cauliflower for autumn use can still be sown, but a variety of cauliflower which matures before frost is likely to cause damage should be chosen. In general this also applies to summer cabbage, which is, however, so much hardier that the frosts of autumn are unlikely to do much harm; some of the varieties of cabbage usually grown for autumn use—for example Henderson's Succession—will, in fact, stand relatively severe weather.

Celery can still be sown, but if the newer self-blanching type is chosen, no time should be lost in districts subject to early autumn frosts. Varieties recommended are Golden Self Blanching, and Solid White (late).

Spinach, Silver Beet, Spinach Beet, New Zealand Spinach

Though spinach, silver beet, spinach beet, and New Zealand spinach differ a good deal in habit, they are similar in their culinary uses. In the colder parts of the country any except the New Zealand Spinach can be sown. The New Zealand spinach (*Tetragonia expansa*) is a half-hardy trailing annual, with large succulent leaves, which thrives in a light, dry soil in a sunny position. It can be sown anywhere in central and northern districts toward the end of the month, but in Canterbury and southern districts sowing should be delayed until the first or second week in November, when frost danger is over. In the warmer parts of the country spinach, particularly the prickly-seeded variety, which is the variety commonly sold in New Zealand, goes to seed quickly, and if a round-seeded variety is chosen, it will be found to "stand" better. For

Plant Food Absorption and the Application of Manure

HOME gardeners often fail to realise that the application of manure, particularly inorganic or artificial manure, requires a considerable understanding of plant husbandry or nutrition. Bulky organic manures (dung, farmyard manure, etc.), so called because they are formed from something that was living, such as plants or animals or both, usually contain a high percentage of moisture and inert matter which improves the mechanical condition of the soil and supplies humus. The less bulky organic manures, such as blood and bone and dried blood, are more concentrated but not immediately soluble in water. Since plants can absorb foods only when these are dissolved in water, the organic manures are safer to apply than the mineral or so-called "artificial" fertilisers which are, as a rule, highly concentrated and readily soluble in water.

The amount of food a plant can absorb varies greatly with its type and its stage of growth or establishment. Small seedlings require very little manure, for instance, but plants that have a well-developed rooting system and a quick-growing, rank type of foliage usually benefit from liberal manuring. The comparative cheapness of artificial manure and a very natural desire to provide ample food for the plant often lead the home gardener to apply too much. As a result the plant may suffer in various ways. The roots may be burned, the plant may be stunted or die, or the leaf tissue may become brown or chlorotic; it may go to seed prematurely, suffer from gummosis or die back, or show other undesirable symptoms.

Plants cannot tolerate very high concentration of soluble plant food and may starve if over-manured. This paradox will be more easily understood if it is realised that plants absorb food, by a process known as osmosis, through the walls of the root hairs, which form a dense, furry mass just behind the growing points of roots and root branches. The bleeding of sap which takes place when, for instance, a vine is cut at the wrong time of the year is due to osmotic pressure inward and upward from the root hairs.

Osmosis of plant roots is a process that takes place where two solutions of the same substance but of different concentrations are separated by a permeable membrane. The walls of each root hair act as a permeable membrane.

If the sap inside the root hair contains less of a plant food, say nitrate, than the water in the soil outside, nitrate will pass into the root as a result of osmosis. This is what happens when a normal dressing of nitrate of soda is applied to a damp soil.

If, however, an over-eager gardener applies too heavy a dressing of nitrate of soda, some of the nitrate may go into the root hairs **but water may at the same time be "sucked" out of the roots.** This process, called plasmolysis, may lead to wilting or even death of the plant. It explains why it is dangerous to apply artificial manures in too-heavy doses, or to a soil when it is relatively dry. It also explains the weedkilling action of sulphate of ammonia and sulphate of iron, which plasmolyse and burn the leaves of weeds like daisies or dandelions.

summer use in warm districts, however, perpetual beet or even silver beet (or swiss chard) is preferred, and at this time of the year it is usually advisable to sow it thinly ½in. deep in rows 18 to 20in. apart and thin the plants to 8 to 10in. apart in the rows rather than to plant out seedlings. The soil should be well drained and contain plenty of organic manure. Blood and bone worked into it at the rate of 3oz. a square yard can also be applied, and when the young plants are established liquid manure at 14-day intervals will assist in stimulating development and produce crisp, succulent growth. If there is reason to suspect that the soil is acid or sour, lime should be dug into it before sowing at the rate of 2 to 3oz. a square yard.

Salad Vegetables

Successive sowings of turnips, spring onions, and radishes should be attended to as required. None of these crops lasts in the best condition for long, and sowings should be arranged to have a new crop approaching maturity as the old passes its best. Small sowings are therefore preferable. Any well-drained soil that has been deeply cultivated and contains a good supply of humus will serve. Rows should be 12 to 15in. apart. Turnips should be thinned 3 to 4in. in the rows and radishes to 2in.; onions do not require thinning.

Sweet Corn

For proper development sweet corn requires consistently-higher temperatures throughout its growing season than are usual in mid-Canterbury and further south, but elsewhere it generally grows quite well. It can be grown on a wide range of soil types provided there is adequate humus available. A situation where the soil warms up quickly in the spring should be chosen, as the plant requires a long growing season to attain full development. Drainage must be adequate and the soil should be sufficiently retentive of moisture to preclude drying out in hot weather.

Soil that is lacking in organic matter can be enriched by a heavy dressing of compost or stable manure, or a green manure crop dug in sufficiently early to allow it to rot down will improve its fertility. On land that has been well supplied with farmyard manure a dressing of superphosphate applied at the rate of about ½lb. to 12ft. of row should give good results, or in the absence of farmyard manure a dressing of ½lb. blood and bone with a liberal dressing of wood ashes can also be dug into the ground before sowing.

Sweet corn can be grown in rows or in "hills" or "clumps." The latter method is recommended, and in each hill or clump half a dozen or more seeds should be planted 1 to 1½in. deep in a circle. Each group should be spaced 36in. apart each way in a place where the growing corn will not unduly shade other plants in the garden. When the plants are about 2in. high they should be thinned so that only the four most vigorous are left. As the plants grow, early removal of suckers which develop from the roots should be beneficial. After-cultivation should be confined to shallow hoeing and removal of weeds; if the top later

[Sparrow Industrial Pictures Ltd. photo.

The sowing now or in the near future of seed of broccoli, winter cabbage, borecole, brussels sprouts, and leeks should not be overlooked if a plentiful supply of winter greens, like that shown above, is to be assured.

tends to throw the plant out of balance, a slight "banking" of the soil against the base will be of assistance in maintaining upright growth.

Recommended varieties are Golden Bantam (early, approximately 125 seeds per oz.), Country Gentleman (230 seeds per oz.), and Stowell's Evergreen. The amount of seed required to sow a given area can be determined on the basis of the figures for one or other of the above varieties.

Tomatoes

Tomatoes can be grown on a wide range of soils, but generally medium or light loams are better than soils which are markedly sandy and clayey, as loamy soils are not so adversely affected by extremes of climatic conditions—they do not become too dry in dry weather or too wet in wet weather. Unlike cabbage and cauliflower, tomatoes do not transplant well into soil which is prevented from settling by the presence of considerable quantities of only partly-rotted organic matter. It is therefore important that green crops or organic material of a similar nature should be dug in some time before planting. Except in a few favoured areas, planting outside cannot be carried out in Canterbury and southern districts without incurring frost risk until about the second week in November, but in northern and central districts tomatoes can be planted out toward the end of October. Soil preparation should begin early. A deeply-dug, well-drained soil rich in humus and a warm, sheltered situation subject to a maximum amount of sunshine are best. Before planting apply to each 9ft. of row up to 4oz. blood and bone or 5oz. finely-ground bonedust, to which has been added a couple of handfuls of superphosphate. The fertiliser can be dusted along a shallow trench taken out with a swan-necked hoe, afterward raking the soil into place.

Tomato plants for setting out should be sturdy, erect, about 6 to 8in. high, and free from disease. If the plants are healthy and have been properly hardened off, the foliage should be of an unblemished dark green and the base of the stems of a dark purple, which, as it extends upward, gradually becomes paler, until it merges with the natural green of the plant.

Hardening off is done by exposing the plants to gradually-increased periods of conditions similar to that in which they will be ultimately planted out. It is advisable to do the final hardening off at home if the plants bought are tender and the weather uncertain.

Unless it is intended to plant dwarf tomatoes, provision must be made for supporting them. They can be staked individually, in which case the stakes should be not less than 18in. in the ground and about 3ft. above ground. Pieces of old conduit, water piping, or strong batten can be used to save unnecessary expense, or the plants can be supported on a sort of fence of wires attached to stout posts. Staked plants can be set out 12 to 15in. and dwarf plants not less than 2ft. apart in the rows; the rows for both should be from 36 to 54in. apart.

Good dwarf varieties are Tatura Dwarf Globe and South Australian Red Dwarf; staked varieties recommended are Best of All, Market King, and Potentate.

Late Autumn and Winter Supply

The sowing now or in the near future of seed of broccoli, winter cabbage, borecole, brussels sprouts, and leeks should not be overlooked. Leeks should be sown without delay, but the preferred sowing dates for the others varies a little according to variety and district. If the young plants are ready for setting out during December to January, they attain nearly full development by late autumn without reaching that stage of maturity at which any check or unusual condition of climate will force them into seed development.

Seed-bed

Crops which play such an important part in the scheme of supply as the foregoing are worthy of the expenditure of some time and effort. The seed-bed should be deeply dug and moderately enriched, preferably some time before sowing, with well-rotted organic material such as farmyard manure or compost. A light, easily-worked, well-drained soil is preferred for the seed-bed, and the seed should be sown thinly ½in. deep in rows 12in. apart.

Leeks

The leek varieties Musselburgh and London Flag are two of the many good ones in seedsmen's catalogues.

Broccoli (Winter Cauliflower)

Varieties of broccoli are available that mature or "head in" from late autumn until November. Examples are Michaelmas Early White, Veitch's Self-protecting (early), Mammoth Winter White, Snow's Improved (winter), Lily White No. 2, St. Valentine (spring), and Late Queen (late spring).

Winter Cabbage

Continuity of supplies of winter cabbage can be assured by planting several varieties such as Ormskirk Early, Drumhead, and Omega.

Even the best "holding" varieties do not "stand" much beyond August in most districts, and provision must be made for a supply of greens such as spring cabbage, broccoli, leeks, or silver beet to follow. The red or pickling cabbage responds well to treatment recommended for the savoy. Good varieties are Red Dutch and Mammoth Rock Red.

Brussels Sprouts

To extend the period of availability, it is a good plan to make two sowings of brussels sprouts. A sowing can be made at once and another in a month or six weeks' time. Varieties recommended are Scrymger's Giant and Long Island Improved.

Borecole (Curly Kale) and Sprouting (non-heading) Broccoli

Except that they are generally harvested later, treatment of borecole and sprouting broccoli is the same as for brussels sprouts. Both are very hardy. They "stand" well and are among the latest of the winter greens. Good varieties are tender and have a delicious flavour. They are worthy of more general use in New Zealand gardens. Varieties recommended are: Borecole, Green Curled; non-heading broccoli, Calabrese, Green Sprouting, and Purple Sprouting.

◆

Agricultural Scholarship at Lincoln College

MR. A. IGGO, B.Agr.,Sc., has been awarded this year's Shell Scholarship of £50 at Lincoln College. Educated at Southland Technical College, Mr. Iggo is holder of the New Zealand University senior scholarship in agriculture and is a winner of the Sir James G. Wilson Prize in Agriculture. He is studying for honours in agricultural science at Lincoln College, where he is investigating the ability of sheep to digest plants and is measuring the effect on sheep of sudden changes in food. He considers that his research may suggest alterations in sheep management which will result in increased production.

◆

Pig Broadcasts

UNDER the auspices of District Pig Councils broadcasts will be delivered in October as under:—

Auckland—1YA, on October 15, at 7.15 p.m., "Answers to Questions," by H. Preston, Supervisor, Northland District Pig Council.

Palmerston North—2ZA, on October 15, at 7 p.m., "Pigs for Profit," by L. Marsdon, Supervisor, Wellington District Pig Council.

Napier—2YH, on October 9, at 7.15 p.m., "Root Crops—Their Importance as Pig Feed," by H. Hopkins, Supervisor, Tairawhiti District Pig Council.

◆

VETERINARY SERVICES POLICY

Farmer-controlled Clubs to be Encouraged

THE general policy to be adopted in the establishment and maintenance of veterinary services to farmers on a national basis was the subject of recent recommendations to the Veterinary Services Council, set up under the Veterinary Services Act, 1946, by a sub-committee of the council. The principal items of the sub-committee's proposals, which were unanimously adopted, are given below.

General: It is the policy of the council to extend the provision of veterinary services in New Zealand by promoting and encouraging the establishment of veterinary clubs or other like bodies in districts where adequate veterinary services are not available. The clubs will be farmer controlled and the veterinarians will be salaried officers.

In sponsoring the club movement in preference to private practice the council has decided that every endeavour shall be made to avoid injuring veterinary surgeons who were rendering efficient service to the farming community and who were established in private practice before the passing of the Act.

Again with a view to protecting the private veterinarian, the council has decided that work among animals not included under the definition of "livestock" in the Veterinary Services Act, 1946, as "cattle, sheep, pigs, horses or dogs kept or used on any farm for the purposes of the business of farming," should not be undertaken by club veterinarians (unless particularly asked for) where qualified private practitioners are reasonably available, and that in the event of such animals being serviced by club veterinarians full professional fees shall be charged.

Formation of Clubs: Organisations contemplating the formation of new clubs should first contact the Veterinary Services Council so that the set-up of the proposed club can be planned to conform to the policy of the council and the particular needs of the district. The council recommends that in dairy districts every endeavour should be made to have clubs conducted through dairy companies. The council also has decided that in club areas not serviced by a private veterinarian or a registered practitioner the club veterinarian should service all animals within the area of the club whether they come under the definition of "livestock" or not, though preference will be given to "livestock."

Co-ordination of Club Activities: In its plan for the future the council has decided upon the formation where circumstances permit of large incorporated clubs, each employing several veterinarians under the supervision and direction of a regional executive. The council favours the disappearance of small clubs and club committees where such is practicable and desirable.

The idea underlying this plan is that existing adjacent clubs will link up and amalgamate where such amalgamation is of mutual benefit to the clubs themselves and the veterinarians employed. Where it is not feasible for an isolated club to amalgamate with others the council approves of control by the executive committee of that club whose duties and functions shall, in the main, be similar to those of regional executives.

The regional executive shall consist of one farmer representative for each veterinarian employed by the executive, together with a reasonable minority representation of its veterinary staff.

This executive shall undertake all the duties of the present club committees and in addition will be responsible for the implementation of the plans and policies of the Veterinary Services Council.

The regional executive shall appoint chief and, in larger organisations, deputy chief regional veterinarians who shall be responsible to the executive for co-ordinating and supervising all the activities of the veterinarians it employs, in addition to undertaking an appropriate amount of club work.

The functions and duties of regional executives shall include employment of veterinary staff for the area of the executive; making of contracts with veterinarians according to council's specimen contract; payment of salaries according to council's salary scale; termination of services of veterinarians in collaboration with local committees when such exist; arrangement of holiday and other leave for veterinary staff; levying of club members and management of finance of the club; payment of mileage allowance to veterinarians according to council's scale; establishment when desirable of central hospital or clinic for special cases; provision of houses, pharmacies, offices, etc., for veterinary staff; arrangement of efficient telephone service between client and veterinarian; purchase of veterinary medicines and other requisites; planning of efficient veterinary cover for the executive's area in accordance with policy of the council; organisation of extension work for the district and animal husbandry and veterinary courses for farmers, farmers' organisations, and schools of learning; assistance to council with its superannuation scheme and with the provision of clinical training for undergraduates and recently-qualified graduates.

In all cases the employing body, whether it be a regional executive or an isolated club, shall be incorporated.

[*Photo News Ltd. photo.*

The first meeting of the Veterinary Services Council. Sitting, from left: Messrs. A. Linton, W. Horrobin, and W. G. Macartney, Dr. J. F. Filmer, Hon. E. L. Cullen, Messrs. W. C. Barry, A. Leslie, R. T. Scott, and C. H. Courtney (secretary). Standing: Messrs. E. L. Greensmith, A. M. W. Greig (liaison officer to Minister of Agriculture), and G. MacDonald. Absent: Mr. G. H. Grigg.

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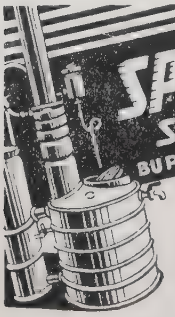

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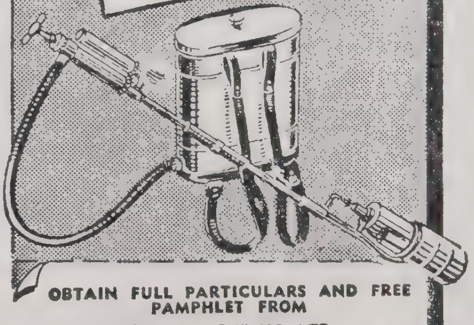

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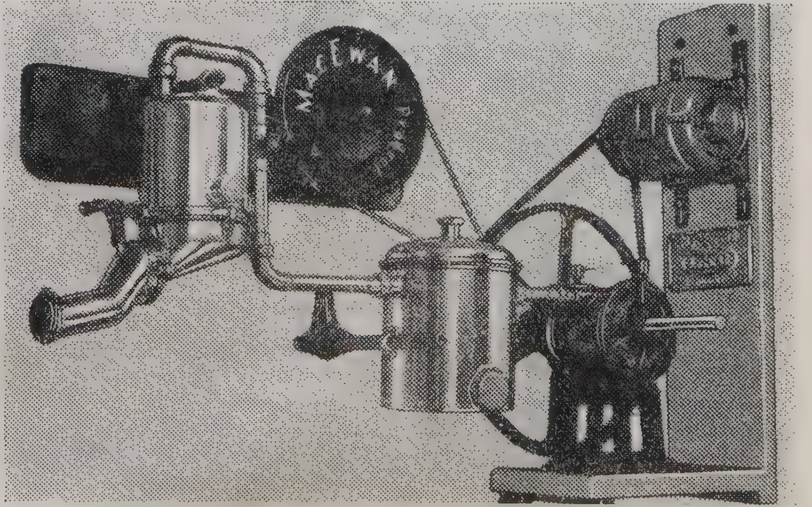

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The regional executive shall provide the council with copies of minutes of meetings, and with such other information as the council may request from time to time.

Where local committees of management are deemed necessary within a regional set-up the council recommends that the committee be small and its duties domestic, and that meetings be held only at long intervals.

The council recommends that where new clubs are being formed an endeavour should be made to have members signed up for a minimum of three years.

Number of Stock and Area per Veterinarian: It is the desire of the council when new clubs are being formed that each shall be as efficient and economic as possible, and that boundaries be clearly defined to prevent overlapping and unnecessary expense in travelling to cases. The council also considers it desirable in the interests of the cost of running a club that a reasonably-high proportion of the farming community in a workable area be members before a club is formed. For these and other reasons the council recommends that before new clubs are formed the council should be consulted.

Contract between Club and Veterinarian: The council has approved of the principles which should be embodied in contracts between veterinarians and employing bodies, and copies of the specimen form which is being drawn by the solicitors to the council will be made available to interested parties.

Salary Scale for Veterinarians: In its deliberations on a salary scale for club veterinarians the council approved of the principle that clubs should provide more and better services and benefits, including a generous superannuation scheme for their veterinarians. The council considers also that by its proposed amalgamation of clubs where practicable veterinarians should benefit by being given more time off during the non-busy season.

The council has decided that all club veterinarians shall be salaried officers and that there shall be no right of private practice. The council, however, approves of the policy of paying, subject to its prior approval, allowances in addition to salary to veterinarians who are required to undertake work in addition to what the council considers a normal quota, such allowance not to affect salary status, superannuation, or seniority. The council also recommends that treatment of animals other than "livestock" within the meaning of the Act should be taken into consideration in fixing the area to be serviced by veterinarians.

The council has also decided:—1. That the annual instrument allowance per veterinarian be £15. 2. That the annual leave be one month on full pay. 3. That the employing body sponsor a circulating library for its veterinarians and own certain instruments only rarely used in veterinary practice. 4. That the employing body pay reasonable expenses of shifting veterinarians from district to district. 5. That the employing body pay expenses of veterinarians while attending conferences and refresher course approved by the council, and 6. That all increases in salaries above £800 per annum shall first have the approval of the council.

The council's salary scale is as follows:—First year after graduation, £550; second year after graduation, £600; third year after graduation, £700; fourth year after graduation, £800. These increases are subject to satisfactory service being given by the veterinarian and are for veterinarians who have been in club or approved private practice since graduation. Above £800 increases are by promotion. The minimum salary recommended for a chief regional veterinarian is £1000 and for a deputy chief regional veterinarian £950.

Subsidies to Clubs: The council has decided for the present to subsidise all approved clubs at the annual rate of £400 per veterinarian. The subsidy shall be payable from April 1, 1947, or in the case of new clubs from the date of employment of the veterinarian. It has also agreed to grant extra financial assistance to efficiently-conducted clubs which in the opinion of the council are handicapped in their operations by special circumstances.

In granting such subsidies to clubs the council has first to be satisfied that the club or association or other like body is so constituted and organised as to provide an efficient veterinary service for its members and satisfactory working conditions for veterinary surgeons employed by it. Further, the council stipulates that subsidised clubs shall amalgamate where possible and desirable and that regional executives and club committees (if any) shall exercise wise judgment in the costs of the administrative machinery necessary to implement fully the council's policy in respect of a complete veterinary cover for the Dominion.

Refunds and Payments to "Livestock" Owners: Section 12 subsection 2 (h) of the Veterinary Services Act, 1946, empowers the council to establish a system for refunds or payments of portions of fees payable by "livestock" owners (not being members of farmers' veterinary clubs or associations or other like bodies) in respect of veterinary services rendered by either qualified veterinarians or registered practitioners. The payment may be made to the "livestock" owner or the veterinarian or registered practitioner.

The section makes it clear that amounts are payable only to "livestock" owners who are not members of clubs or associations or other like bodies receiving a subsidy from the Veterinary Services Council. It will be necessary, therfore, for a "livestock" owner who claims a payment from the council to certify that the amount applied for is in respect of veterinary services rendered to "livestock" not already subsidised through a veterinary club. (NOTE: A "livestock" owner may be a member of a club and yet be entitled to a payment because he owns animals in a non-club area.)

The council's system is designed to give protection to private veterinarians who were in practice at the time of the passing of the Act, and to give to non-club "stock owners" their just share of the funds of the council to which they contribute through one or more of the contributing boards. It is the intention of the council not to allow its policy to prove detrimental to the expansion of the club movement throughout the Dominion.

Payments may be made to veterinarians or registered practitioners under three sets of conditions of veterinary practice:—

1. To private veterinary surgeons and registered practitioners practising outside club areas.

2. To private veterinary surgeons and registered practitioners within club areas and who were in practice at the time of passing of the Veterinary Services Act, and

3. To private veterinary surgeons and registered practitioners who have been actively practising in any area before the formation of a club in that area.

No payment shall be made to private veterinarians or registered practitioners who commence practice in a club area after the formation of a club.

Payments may also be made to clubs or other like bodies in respect to visits by their veterinarians to "livestock" owners outside club areas.

The council has decided that the payment at present shall be 7s. 6d. per visit and that it be paid by the council to the veterinarian or registered practitioner on the receipt by the council of the approved form duly signed by the "livestock" owner on whose visit the refund is claimed. The veterinarian, registered practitioner, or club shall make a corresponding reduction of 7/6 per visit in fees charged, and this should be clearly shown in his accounts to the "livestock" owners. This policy will be adopted from September 1, 1947, but owners of "livestock" who have incurred veterinary fees between April 1 and August 31, 1947, may receive a refund of 7s. 6d. per visit on presentation of receipted accounts from the veterinarian.

Wheat Growers' Compensation Scheme

THE fund administered by the Wheat Committee to provide compensation to New Zealand wheat growers whose crops are damaged by flood, frost, or hail to the extent of more than 50 per cent. has now existed for four years. For this cover wheat growers pay ½d. a bushel premium on all wheat handled by the committee. Only damage by the three most dangerous weather factors is covered, and not losses from such causes as rust, mildew, or take all. Claims paid to January 31, 1947, numbered 204 (flood 71, frost 22, and hail 111) and amounted to £22,713, an average of £3 19s. an acre. Administration expenses, mostly fees and travelling expenses paid to assessors and the adjuster, amount to only 5.8 per cent. of the premium income, and £26,142 has now accumulated in the trust fund.

THE scheme is working satisfactorily and has been the means of assisting many growers whose wheat crops have been damaged severely through circumstances beyond their control. It is not intended to cover fully all losses by hail, frost, or flood, but is designed to protect growers against disaster, and for that reason the amount of cover is limited to half the value of the normal or actual yield. Any greater protection would cost a correspondingly greater premium.

Following is a summary of extracts from the Board of Trade Regulations, 1944, dealing with some of the more salient points of the scheme. Growers should take particular note of Regulation 148, which states that no claim will be entertained unless notice is given to the Wheat Committee, Christchurch, not later than seven days after damage could reasonably be expected to be manifest, or in the case of damage by flood, not later than seven days after the subsidence of the flood waters. Claim forms are available from the Department of Agriculture's offices, wheat brokers, or from the Wheat Committee, Box 1280, Christchurch.

"Flood damage" is defined as damage resulting from the overflow of water from a natural watercourse or from abnormal flow of drainage water from higher ground and "flood" has a corresponding meaning. (Heavy rain in itself does not therefore constitute a flood within the meaning of the regulations.)

"Frost damage" means damage caused by late spring frosts resulting in the killing of flowers or grains, but does not include damage to the vigour of a plant or damage to the growth of a grain that is not killed.

"Normal yield" means the yield in bushels to the acre which, in the opinion of the adjuster and assessors or of the committee, a paddock would have averaged in the particular season, taking into consideration weather (except the weather giving rise to the claim for compensation) and all other circumstances, had the damage for which compensation is claimed not occurred.

"Paddock" means an area sown in wheat which, in the opinion of the committee, is treated as a single unit of cultivation, notwithstanding that it may be intersected by watercourses, roads, or other physical features, and notwithstanding that it may not be physically separated from any other unit of cultivation.

Regulations

146. Every grower of wheat for sale whose crop suffers from frost damage (as herein defined) and whose yield for the season from any separate paddock is less than one-half of the normal yield (as herein defined), or whose crop suffers from hail damage or flood damage (as herein defined) and whose proceeds of the yield for the season from any separate paddock are less than one-half of the proceeds of the normal yield (as herein defined), shall, subject to compliance with the requirements of this regulation, and if the crop is harvested or the land is occupied by the crop until the normal time of harvest, or until such time previous thereto as the committee may in any particular case authorise for the ploughing in or other disposal of crop, be entitled in respect of that paddock to claim compensation for part of the deficiency arising from such respective damage as aforesaid to the extent set out in Regulation 154 hereof, subject, in the case of flood damage, to Regulation 160 hereof.

[Though an amendment was gazetted in December, 1945, giving the Wheat Committee (members of which are trustees of the fund) discretionary powers enabling it, in special circumstances, to permit a damaged crop to be ploughed under without being carried forward to harvest, a crop drowned out soon after sowing should be resown. If a grower has a wheat crop drowned out, and resows with another cereal crop in the same crop year, he does not qualify for compensation under the scheme.]

147. The amount of every claim shall be assessed by an adjuster appointed by the committee and two assessors appointed by the committee, one to represent the claimant and to be appointed upon nomination by a local electoral committee member of the organisation known as United Wheatgrowers (N.Z.), Ltd., or in such other way as the committee thinks sufficient, and the other to represent the committee.

148. No claim shall be entertained unless after the occurrence of damage to the growing crop due to frost, hail, or flood, the claimant gives written notice thereof to the committee setting out the date and nature of the occurrence and such notice must be given not later than seven days after such damage could reasonably be expected to be manifest or in the case of damage by flood not later than seven days after the subsidence of the flood waters.

149. No further notice of claim shall be required than the notice referred to in the last preceding regulation hereof, but if after giving such notice the claimant decides not to seek compensation he shall forthwith notify the committee to that effect.

150. The claimant shall at all times permit any person appointed in that behalf by the committee to enter and view the paddock and take samples of crop and shall afford all assistance and supply all information reasonably required by any such person.

151. The claimant shall on a day not more than twenty-eight nor less than fourteen days prior to the date on which he then estimates that the crop will be ready for harvest give notice to the committee by telegram confirmed by notice in writing of the day on which he estimates that the crop will be ready for harvest.

152. As soon as may be after the crop is harvested or the time for harvesting is passed and the yield (if any) is ascertained the adjuster and assessors shall jointly inquire and report to the committee their opinion as to:—

(i) The normal yield of the paddock;
(ii) The actual yield of the paddock;
(iii) The extent of loss suffered by the claimant through the damage claimed for;
(iv) The amount of compensation that in the case of hail damage or flood damage would place the claimant in the same position as if the proceeds of the actual yield had been one-half of the proceeds of the normal yield, or, in the case of frost damage, the amount of compensation that would place the claimant in the same position as if the actual yield in bushels had been one-half of the normal yield (as herin defined): or
(v) Whether the claim is within the provisions of Regulation 146 hereof and is not excluded by Regulation 160 hereof.

153. The committee shall consider the said reports and may approve the claims so reported or may in any case if it thinks an erroneous finding has been reached disapprove a claim or any part thereof.

154. When the reports of adjusters and assessors on all claims have been received and considered the committee shall deduct and retain from the fund all expenses incurred in the administration of the fund and of the compensation scheme comprised in this part of these regulations including expenses of inspection and adjusters' and assessors' fees and expenses as estimated by or authorised or paid by the committee in its discretion and shall apply the residue of the fund as far as it extends in payment pro rata in respect of all approved claims of sums that will according to the reports received place the claimants in the case of frost damage in the same position as if the actual yield had been one-half of the normal yield, or, in the case of hail damage or flood damage, in the same position as if the proceeds of the actual yield had been one-half of the proceeds of the normal yield.

157. Except in special cases where the adjuster and assessors are satisfied with other evidence, the claimant shall produce a certificate signed by the contractor or other person by whom the crop was threshed stating that he threshed the whole of the crop grown in the paddock in question, or so much thereof as was considered to be worth harvesting, and setting out the number of bushels of wheat threshed from the crop, or, if the claimant has himself threshed the crop, a statutory declaration made by him to the same effect; but this provision shall not prevent the adjuster and assessors from requiring such further evidence as they may in any case think necessary.

159. In case the adjuster and assessors are unable to agree on their finding, the finding of a majority of them shall be reported to the committee and may be acted on by the committee, and in case no two of them agree, another adjuster and assessors shall be appointed by the committee for the case.

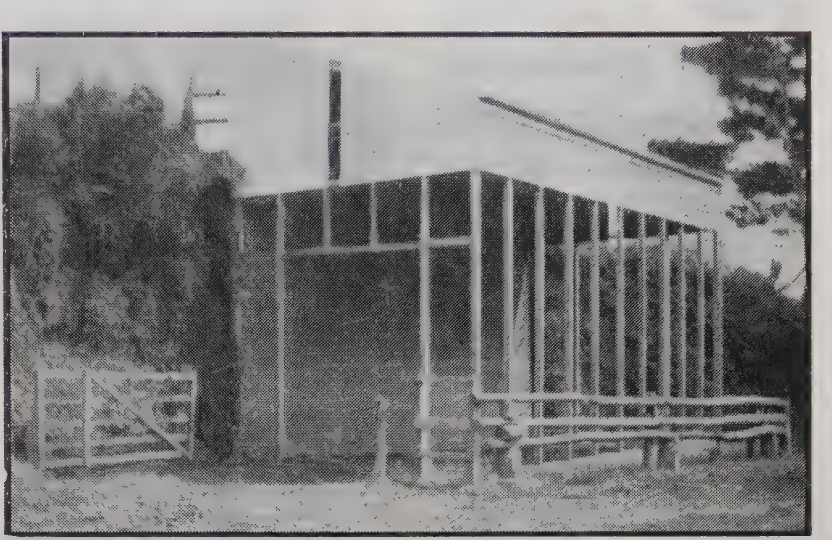
160. No compensation shall be payable for flood damage which in the opinion of the committee is due to negligent farming, neglect of watercourses, or other negligence on the part of the claimant.

OATS

Bulletin No. 270, "Oats," dealing with the growing and harvesting of the oat crop, is now available free from any office of the Department of Agriculture.

A HILLSIDE BARN FOR THE STORAGE OF HAY

By J. M. HOPKINS, *Instructor in Agriculture, Levin.*



THE storage of hay in open sheds of the Dutch barn type may not be common in New Zealand, but they offer a useful means of keeping hay dry and palatable, especially in high-rainfall districts where indifferent weather is often experienced during harvesting. In practically all west coast districts of the North Island, for instance, an ideal haymaking season is seldom experienced, and often the harvesting and stacking of the crop is a precarious business. Haystacks must be very well constructed, well topped off, and adequately covered to shed rain water.

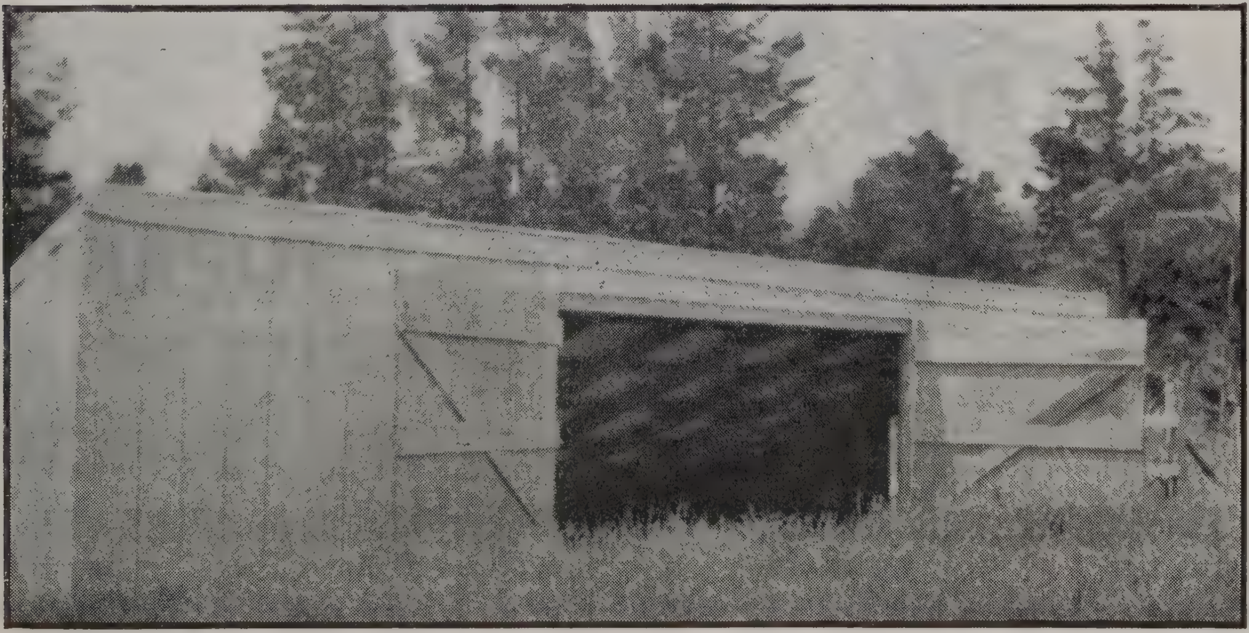
HAY can be stored quickly in barns of the Dutch type, no water can run down through it because of the covered roof, and little if any waste occurs if the barn is evenly filled and properly tramped. Baled or pressed hay can be stored efficiently in such barns, and the use of balers, both stationary and pick-up, is increasing every year

Barn Built into a Bank

An interesting barn of the Dutch type, but built into a bank, is illustrated in this article. The barn has three instead of four open sides, that against the bank being constructed of concrete to form a wall, which is anchored to the bank to give added stability. The roof of the barn is sloping, with the wall on the top side extending 6ft. above the top of the bank and carrying the double doors through which the barn is filled during harvesting. Except for a low wall carrying the studs on the long open side of the barn, no other concrete has been used, and the hay rests on logs placed on the earthen floor.

The dimensions of the barn are: Height of the concrete wall at the back, 18ft.; height of the studs, 18ft.; length, 30ft.; width, 14ft. The roof is of corrugated iron with board sides, and all uprights are of dressed timber. The bottom portion is fenced off with a post-and-rail fence and a gate through which the stored material is loaded on to the dray or truck for feeding out.

When full the barn holds about 20 tons of hay. The saving in time and labour is considerable, and waste in the stored material is negligible. In many districts where the country is undulating to hilly there are sheltered banks and hillsides on farms where barns of the type described would be very useful.



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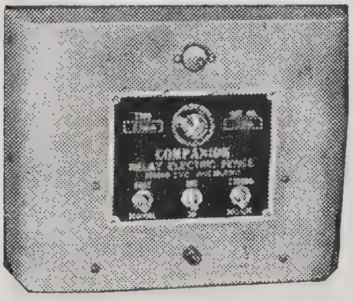

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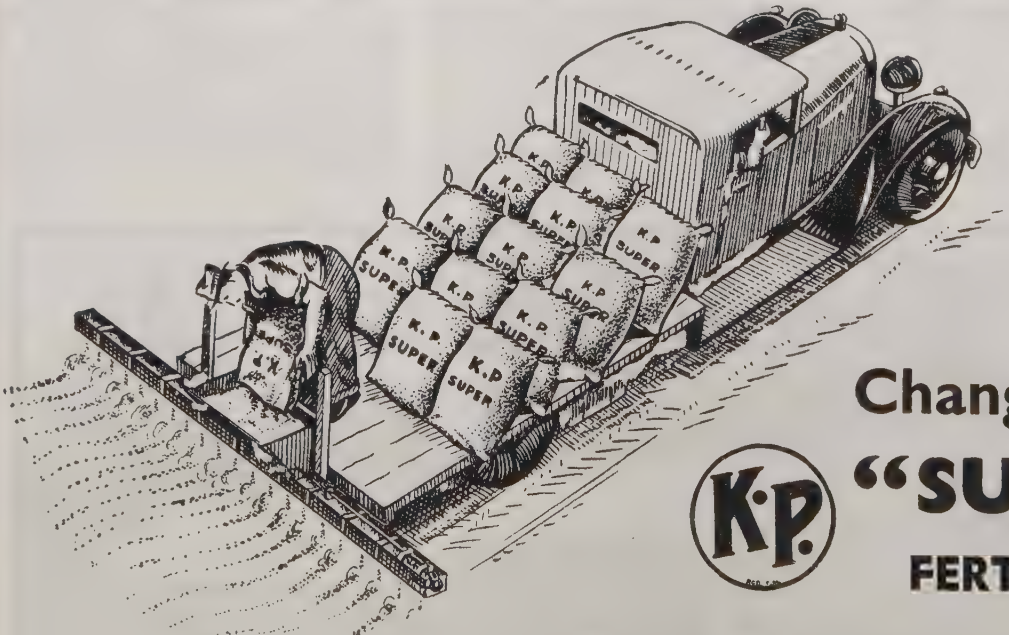

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AUCKLAND WANGANUI CHRISTCHURCH DUNEDIN

Spring Treatment of Newly-planted Raspberry Canes

THE rapid establishment of raspberries and a reduction in the risk of infection of new shoots by diseases which may have been present on the canes when planted can be assured if attention is given to certain details by the grower, writes J. P. Hudson, Horticulturist, Wellington.

ON no account should raspberry canes be allowed to fruit in the first season after planting. To prevent fruiting and to throw all the energy of the young plants into producing new canes the newly-planted canes should be cut down drastically between the time of planting and the early spring, as described in detail in the March, 1947, issue of the "Journal."

They should not be cut down too low at this first pruning. Many of the plants will not grow at all unless one or more of the buds on each planted cane produce leaves, which serve to keep the plant alive until a new cane grows up from below the ground.

As soon as possible after new shoots have grown from below the soil and reached about 6in. high the old canes should be cut down with the secateurs to just below ground level and the prunings put in a bucket, taken away, and burnt (Fig. 1).

It is usually necessary to go over the beds several times in the early summer, as new canes will grow on some plants much earlier than on others.

A proportion of the raspberries may be very tardy in producing any new canes at all. Even in these cases the planted canes should not be cut down until new shoots eventually grow, but if fruiting laterals start to grow from the buds on the planted canes, it is worth while to cut off the tips of these laterals to prevent them from forming flowers and bearing fruit.

Raspberry Cane Spot

Raspberry cane spot disease causes dark spots to appear on the new cane from early summer onward. The spots later increase in size and become small grey "pits" with purple borders (Fig. 2) or may run together and cause irregular cankers which can seriously affect the size and health of the canes. In their second year infected canes may fail badly, as many of the fruit buds either do not grow at all or produce just one or two small leaves, or they may grow into dwarfed laterals which do not fruit or bear only hard, dry, misshapen and useless berries. Apart from loss of fruit from this cause, the young developing fruit on healthy canes can also be attacked by the fungus, which causes one or more of the "pips" to remain green and hard and gives the fruit a lop-sided appearance.

Cutting newly-planted canes down to ground level when the suckers are 6in. high (but not before) will reduce the risk of the new shoots being infected with cane spot from the old canes. It is also worth while toward the end of the growing season to cut out heavily-infected canes to ground level, and burn them, because they will not, in any case, bear a useful crop and will serve only as a centre of infection for other canes.

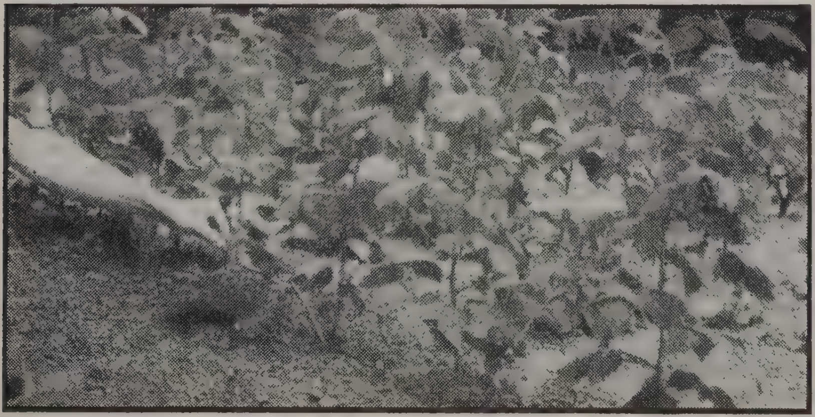


Fig. 1—These three old canes, outlined in white, should have been cut out when the newly-planted canes were 6in. high.

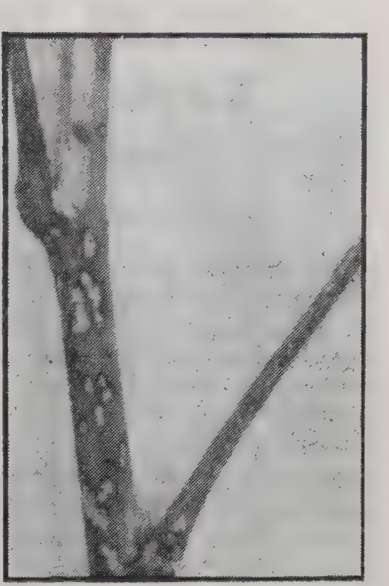


Fig. 2—Raspberry cane spot.

The routine spray programme recommended for raspberries will give an excellent control of cane spot and a much-improved vigour of cane and yield of fruit.

Need of Spraying Small Fruits

Our grandfathers may have grown good crops of small fruits without spraying them, but they handed on to us a legacy of gradually-increasing pests and diseases. It is doubtful whether even our forefathers, good gardeners as they may have been, could grow profitable crops of the modern varieties without resorting to sprays and dusts.

A suitable spraying programme, if faithfully followed, usually leads to heavier, more reliable crops of cleaner, better fruit.

The following recommendations are made in Bulletin No. 258, "Raspberry Culture in New Zealand," copies of which may be obtained free from any office of the Department of Agriculture:—

"1. Spray at 'bud movement' in the spring with Bordeaux mixture (5:4:50) plus lead arsenate (powder) at the rate of 2lb. per 100 gallons of spray. (To make 4 gallons of spray, use the following quantities of ingredients: Bluestone 6½oz., hydrated lime 5oz., lead arsenate (powder) 1¼oz.)

"2. Spray just before blossoming with Bordeaux mixture (3:4:50) plus lead arsenate (powder) at the rate of 2lb. per 100 gallons of spray. (To make 4 gallons of spray the necessary quantities of the ingredients are: Bluestone 4oz., hydrated lime 5oz., lead arsenate 1¼oz.)"

The spray recommended in paragraph 2 should be repeated at petal fall and again late in March, when the crop has been harvested.

ENSILING AND HAYMAKING

Surplus Pasture Growth Should be Conserved

By P. R. BARRER, *Instructor in Agriculture, Christchurch.*

ON grassland farms, as on cropping farms, October should be one of the busiest months. In an average year two-thirds of the grass production on a North Island farm occurs during about four months, from September to December. Certainly feed requirements are greatest during this period, as on dairy farms cows are in full milk and on sheep farms stock numbers are at their greatest, but stock should not require more than a third or a half above their winter requirements. Consequently unless measures are taken during September, October, November, and December to conserve or make special use of a large proportion of the farm pastures, a considerable amount of feed may be wasted.

IN theory 50 of every 100 acres on the entirely grassland dairy farm should be shut up for part of this four-monthly period for the saving of hay or silage, but actually few farms reach such a high figure.

Shutting up Paddocks

Whatever the acreage of hay or silage aimed at, the shutting up of paddocks should not be done in a haphazard way; there should be careful planning before early September, when paddocks should already be closed, though perhaps some hay paddocks may be closed up later. Seasonal, farm, and district conditions will determine actual times of closing.

Early shutting up and early harvesting of fields for silage, which is a feature of some well-managed farms, not only enables the hay area to be dealt with when the weather is right, but also allows a good growth of aftermath from the silage paddocks when the hay area is still closed to stock.

Hay or silage is never as good as the grass from which it is made; there is always some loss of nutrients in the weathering, curing, and harvesting of the crop. The object of the good farmer should be first to use good pastures, lucerne, red clover, or other material at the best stage of growth, and secondly to ensure that there is as little loss as possible from the time the crop is cut until it is utilised. High-quality hay or silage cannot be made from over-mature, stalky herbage or from pastures that are mainly composed of weeds and coarse grasses. However, weeds such as Scotch thistle can be usefully incorporated with the silage crop, though they are a decided disadvantage in hay.

When to Cut

The stage of growth at which pasture is cut for silage is vitally important, as it will largely determine the ability of the farmer to make a good or bad product. Over-mature herbage will produce dark-brown or even a black type of silage, with the frequent formation of the undesirable rancid-smelling butyric acid. Slightly-immature pasture ensiled at low temperatures results in the green, fruity type of silage which is a valuable foodstuff, but which loses much juice and nutrients in its manufacture. The type of silage to aim at is the acid, yellow-brown sort with a pleasant smell. This is produced at a temperature of about 100 F. from pasture that is neither immature nor over-mature.

Making of Silage

Silage can be made in pits, towers, trenches, or stacks. On rolling or terraced farms it is possible to make use of the farm contours to construct conveniently-placed pits, towers, or trenches. On entirely flat farms stacks or towers will be the alternatives. Pits or trenches should be so placed that they are not liable to flooding from surplus water and should be located conveniently not only for harvesting but also for feeding out. Trenches constructed with sloping approaches are very good, as consolidation can be effected in the actual construction of the silo by driving the sweep over it or by driving cattle over it. Stacks must not be built too quickly or they are liable to heat. Exposure to strong winds will also cause this and may result in the stack becoming lop-sided or toppling right over.

The first cut of lucerne is better made into silage; the likeliness of weeds in the crop and the unfavourable weather for drying usually experienced then make haying inadvisable. By itself lucerne does not make good-quality silage, and it is a good practice to alternate a load of lucerne with a load of grass. Green maize and millet are excellent fodders for making quality silage and may be mixed with lucerne or grass. The maize and millet are best chaffed up for this purpose.

Over-mature Hay Means Loss

Much good hay is lost through farmers allowing the crop to get over-mature and stalky before cutting it. The most valuable part of hay is the leaf and not the stalks or seeds, so a hay crop should not be left to go to seed before it is cut. The lucerne crop is best cut when new shoots are starting to come from the base of many of the plants. Grass for hay should be cut before the grasses are fully out in flower. Over-mature or "seeds" hay contains less protein, less mineral, and more fibre than that cut at the correct stage.

Once hay is cut handling should be reduced to the minimum compatible with the necessary drying and harvesting of the crop. Too much handling results in the loss of the brittle and valuable leaves when they dry out, particularly with lucerne, so where possible the often-disregarded practice of cocking is particularly desirable with this crop. Of course the weather may frequently necessitate turning a crop many times in the windrow. For this purpose the swath turner may be employed. The aim in weathering and "curing" should be to obtain a product that is not too bleached by the sun but still retains some of the natural green colour in the leaf.

Baling and Stacking

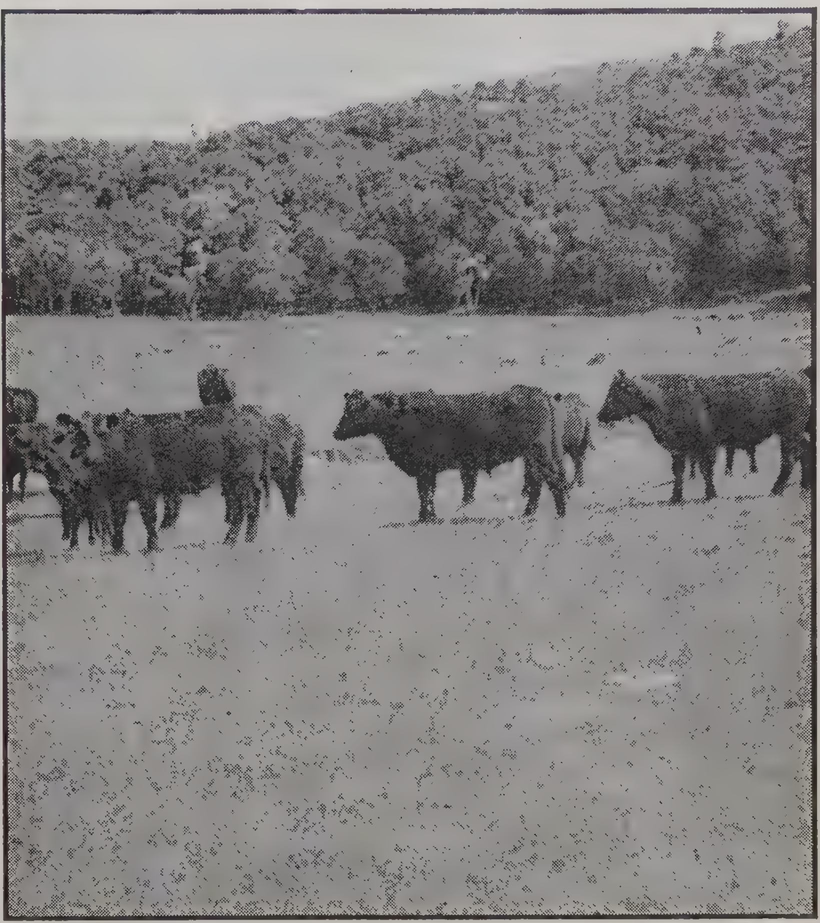
The pick-up hay baler is more and more replacing the older method of haymaking, but so far to a less extent than the header has replaced the mill. Its main advantages are the saving of labour and the consequent economy of operation. The hay baler can turn out a very high-quality product, but frequently bales are musty and damp due to baling when the crop is not in good condition. Whether a farmer is dependent on contractors or whether he uses his own machine, he should do his best to see that all the good work put in up to the time of baling is not then lost by lack of care and too much hurry. Once the crop is baled it may be stooked for further drying out. Finally the bales should be stacked in such a way as to allow the passage of some air through them.

Once the hay is in stack, whether baled or not, it should be protected not only from rain but also from stock. Haystacks should be well covered, or even thatched, and protected from stock by fencing. Similarly silage trenches or stacks should be properly fenced from stock.

NATIVE BUSH AN EXCELLENT STOCK SHELTER

Its Protection and Regeneration Well Worth While

THE protection and preservation of many remnants of native bush which exist on farms are urged by J. M. Hopkins, Instructor in Agriculture, Levin, who believes that a well-protected bush area cannot be surpassed as shelter for stock against cold winds and driving rain.



[*Public Works Department photo.*

Shelter, with good pasture and contented stock.

REMNANTS of the once splendid native forest which clothed considerable areas of the North Island are to be found on many farms today, and the protection and in many cases the need for regeneration of these bush remnants are well worth considering. Too often small patches of bush are nothing but groups of dying trees, wind blown, stock damaged, and little use as shelter or protection. In fact, they are more of a danger than a benefit to stock and are similar in effect to an open, draughty plantation of exotic trees.

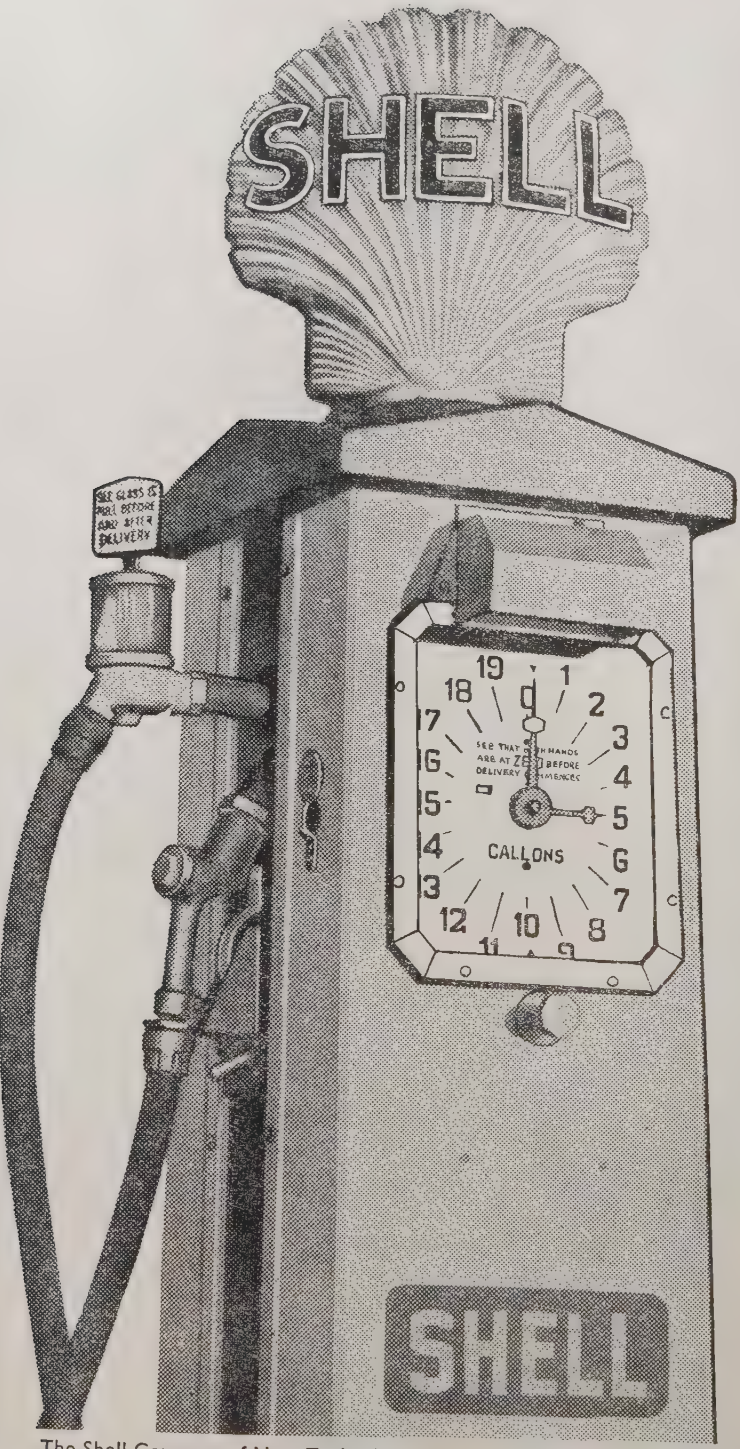
There are, however, many areas which are well worth saving, and these areas warrant protection and regeneration. A well-protected area of native bush with good undergrowth is unsurpassed as shelter for stock; it adds to the appearance of any farm, and if situated on steep slopes tends to protect the land from erosion. Many of New Zealand's native birds also shelter and nest in such bush areas.

Native bush severely damaged by stock and strong winds. All tree specimens are dying and the area is of little use.

Shelter for Stock

Just as a well-established and protected plantation of exotic trees or a good hedge protects stock from cold winds and driving rain, so does an area of native bush with substantial undergrowth. The bush is already on the land and in many cases requires only adequate fencing to make it the ideal shelter for stock. On flat or rolling land it gives shelter from all quarters, and may be situated where certain desirable exotic species of trees will not grow.

For effective protection native bush should be strongly fenced, because if stock have access to it the undergrowth is eaten out, the trees become damaged, and natural regeneration is prevented. Native trees naturally reproduce through the undergrowth, some shade and protection being necessary for most forest trees and shrubs to become established. Stock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not only eat the undergrowth, but also destroy all young forest trees, and in time the bush floor is bare of growth. Strong winds then damage the trees, which become spindly and eventually die.

Bush on steep slopes near Paraparaumu helps to protect land from erosion.

Regeneration of Bush

If not too badly damaged, bush areas soon make undergrowth once they are fenced. Ferns and small shrubs appear, existing trees make fresh growth, and before long young forest trees germinate from seed and begin to make growth. Also once protection has been given, the thickening up of areas can be made more rapid by transplanting native trees and shrubs from other sources, though this may not be practicable in large areas. However, where areas are small transplanting can be quite successful and is certainly a help in making the bush shelter effective in a shorter period.

Some of the more rapid-growing native hedge plants and trees which are easily transplanted are as follows: Broadleaf or papaumu, karaka, taupata, karo, tarata or lemon wood, and hoheria or lacebark. The slow-growing puriri is also a valuable tree for planting in some of the milder coastal districts. Actually the particular climatic conditions and the source of supply govern the species of tree or shrub which it is advisable to transplant, so no hard-and-fast rules or recommendations can be made.

Added protection to bush shelter in an exposed position should be given by planting suitable exotic trees on the quarter of the prevailing wind; for instance, on the Manawatu coast prevailing winds are off the sea, and when strong these winds have a considerable burning effect on foliage. Once the protective trees are established and making growth they prevent damage to undergrowth from strong winds, and also stop draughts from blowing through the bush area.

Summary

The main points in the preservation of native bush areas on farms are therefore as follows:—

Remnants of native bush, if too badly damaged by stock and weather, should be eliminated, as they make draughty situations for stock.

Areas of bush, however small, with full and well-developed undergrowth are unsurpassed as shelter for stock, often giving shelter from all quarters.

If situated on steep slopes, native bush reduces erosion.

Sound fences are necessary to protect bush areas.

Additional protection by planting should be given to bush areas in exposed positions.

Well-cared-for bush areas enhance the appearance of any farm.

A well-protected area at Levin, where added protection on the south-west side has been given b

Concrete Hive Roofs

By D. S. ROBINSON, *Apiary Instructor, Hastings.*

WITH sheets of galvanised flat iron at present almost unprocurable for covering the roofs of beehives, it is therefore necessary in many cases to use a substitute. A hive roof that is thoroughly serviceable and practically everlasting can be made of reinforced concrete. This class of hive roof has been used successfully for a number of years by Mr. C. Fafeita, Eketahuna, by whom the construction details in this article were supplied.

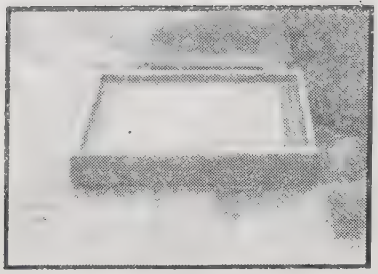


Fig. 1—Mould ready for use.

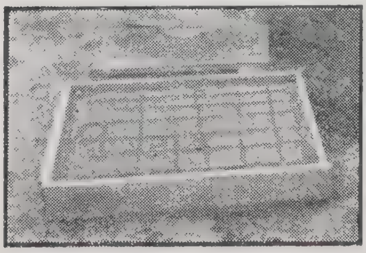


Fig. 2—Mould partly filled with reinforcing in position.

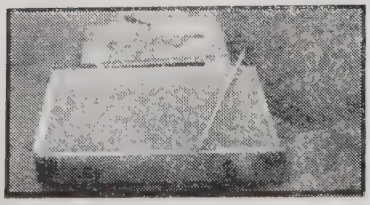


Fig. 3—Surface levelled with straight edge.

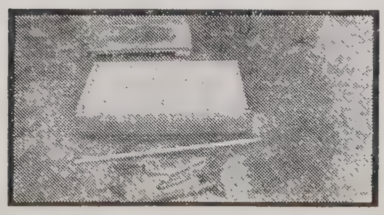


Fig. 4—Even surface after dusting with dry cement.

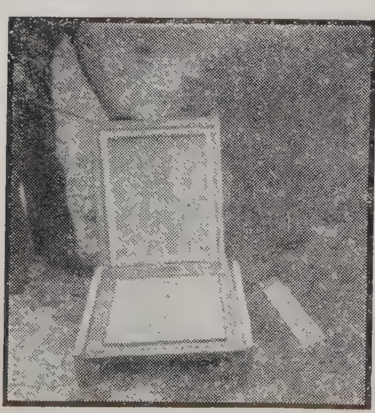


Fig. 5—Finished roof showing ends of frame removed.

EKETAHUNA has a very damp climate with a heavy rainfall at times, and is also subject to high winds. By using concrete hive roofs Mr. Fafeita has never been troubled with hives that are damp inside or with mouldy combs, nor has he had a hive blown over. Where concrete roofs are used no stones or other weights are necessary on the hives.

The roof consists of a slab of reinforced concrete 1¼in. thick with a sunken portion to fit over the super and a weathering groove toward the outer edge to prevent water entering the hive. For migratory beekeeping the weight of the roof (about 43lb.) is a serious disadvantage, but for permanent apiaries in very windy localities it has much to commend it. The maximum cost of a roof would be about 1s. 6d., exclusive of labour, on today's prices for material.

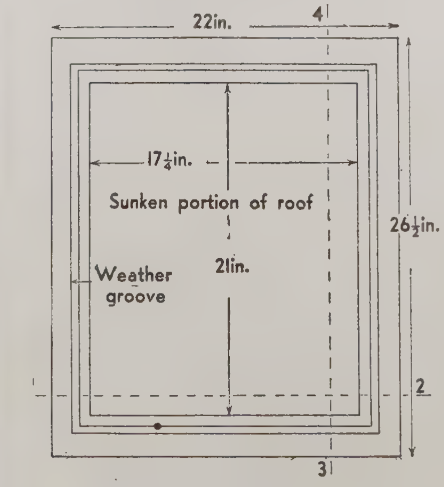
The timber used in making the mould for casting these roofs must be thoroughly dry and carefully dressed to give a good appearance to the finished roof.

Mould: The mould shown in Fig. 1 consists of a platform of 1in. timber (26½in. x 22in.) tightly cramped up and well nailed to two bearers, each 22in. x 2in. x 1¾in. On the platform are fixed the boards to form the sunken portion of the roof.

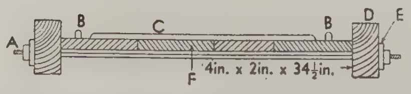
Sunken Portion of Roof: Boards forming the sunken portion of the roof cover an area 17¼in. x 21in. x ½in. thick, with outside edges slightly bevelled and well nailed to the centre of the platform; that is, 2⅜in. from the ends and 2¾in. from the sides.

Weathering: A ½in. fillet, rounded at the top and mitred at the corners, is then nailed at a distance of ¾in. from

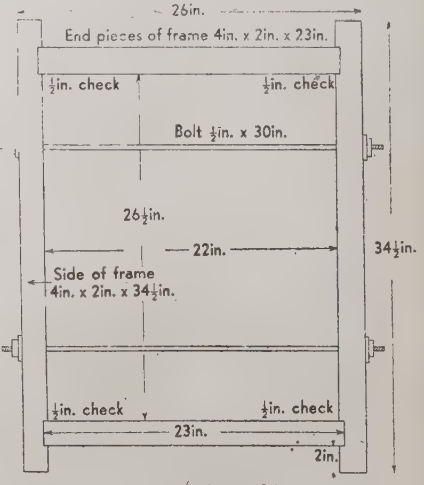
CONSTRUCTIONAL DETAILS OF THE MOULD



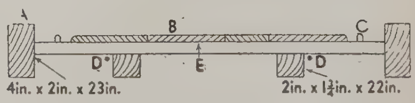
Plan of inside of hive roof.



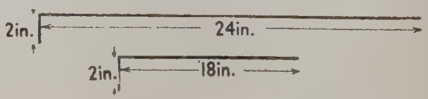
Section of mould through 1-2. A ½in. x 30in. bolt. B weather fillets. C ½in. board forming sunken portion of roof with bevelled edges. D side of frame. E 2in. x 2in. x ¼in. washer. F platform.



Frame of mould.



Section of mould through 3-4. A end of frame. B ½in. boards forming sunken portion of roof with bevelled edges. C weather fillet. D bolts. E platform of 1in. boards.



No. 8 gauge wire for reinforcing.

the raised portion to form a weathering groove in the finished roof.

Frame of Mould: A frame is made of 4in. x 2in. timber to fit round the platform to hold the concrete in place while it is setting. The frame is detachable to allow the roof to be easily removed after casting, the sides of the frame being 34½in. x 4in. x 2in. and the ends 23in. x 4in. x 2in. At a distance of 2in. from each end of the inner side of each side piece a slot is cut ½in. deep to take the end pieces which complete the frame. Through each side piece (10in. from each end) a ½in. hole is bored to take ½in. x 30in. rods and bolts. These clamp the frame tightly round the platform. The bolts should be provided with plates (2in. x 2in. x ¼in.) at each end to act as washers, while the threads on the bolts should be kept well greased. The inside measurement of the frame must be the exact size of the platform. For use, the platform is placed on a level surface and the frame clamped round it. The top of the frame stands 1¼in. above the surface of the platform, 1¼in. being the thickness of the roof.

Concrete: The concrete should consist of 2 parts of sandy shingle, fine enough to pass through a ½in. mesh riddle, and 1 part of cement. The shingle must be well washed and should contain no foreign matter. The shingle and cement should be thoroughly mixed, dry; then water should be added, and again well mixed, using just enough water to make the mixture wet but **not sloppy**. By adding a handful of washing soda to 2 gallons of water for moistening the mixture a quicker setting of the cement will be ensured.

Reinforcing.—The requirements for this are 12 pieces of No. 8 gauge fencing wire, 6 pieces 26in. long and 6 pieces 20in. long, bent at right angles 2in. from one end only, and laid across one another. New wire should be used, as rusty wire is apt to corrode and later lead to cracks in the roof.

Casting the Mould: The platform and frame, tightly bolted together, are placed on a level surface. Coat the inside of the frame and the whole platform thoroughly with fat, soft soap, or used car oil to prevent the concrete adhering to the mould. The platform and raised portion attached to the platform are then dusted lightly with dry cement, following which a portion of concrete mixture is added and thoroughly pressed down to consolidate it. After placing the reinforcing in position, evenly spaced out as illustrated in Fig. 2, place the balance of the concrete in the mould and gently press it down. Level the top by using a straight edge, resting it on the frame (Fig. 3). Next dust dry cement over the concrete and trowel off, leaving an even surface (Fig. 4).

An apiary with concrete hive roofs in use. The ample overhang gives protection to the woodwork of the hives.

The mould should then be covered with a slightly damp sack and protected from frosts, a hot sun, or a drying wind, and left for at least four days before the casting is removed. The mould should be carefully cleaned before further use and well oiled or coated with soap or fat.

Removing Casting: Slacken off the bolts, remove the ends of the frame, and stand the mould on end before gently levering off the casting by working round the edges with a trowel or stiff knife.

The new castings should be laid on a level surface to season, and, if stacked in tiers, slips of wood should be placed between each of them to allow a current of air to pass between the roofs.

If cracks appear in the roof, these may be filled in with a little neat cement and water mixed to a stiff paste. Wet the surface before forcing in the cement.

Painting: Should it be decided to paint the roof, a coat of tung oil should be applied first, two coats being put on if the surface is very porous. Ordinary paint may then be used. Tung oil should not be applied until the castings have seasoned for at least 14 days.

Cement, being of a neutral colour, does not attract the heat in summer, while the thickness of the roof keeps the hive warm during colder weather. As the roof is fairly heavy no additional weights are required to prevent it from being blown off, considerable time thus being saved when hives are being examined. Also the cost of production is about a third of that of metal-covered roofs, with no expense in upkeep. One bag of cement will make 17 to 19 roofs, which are practically everlasting.

Should hive mats become moist because of condensation, two strips of wood, ¼in. thick, laid over the mats to allow an air space between the roof and the mat will overcome this trouble, as it will with a metal-covered roof.

For making the mould for a standard size hive (outside measurements 20in. x 16in.) the following materials (finished sizes) are required:—

2 pieces 4in. x 2in. x 34½in. for sides of frame.

2 pieces 4in. x 2in. x 23in. for ends of frame.

2 pieces 2in. x 1¾in. x 22in. for bearers for platform.

3 pieces 6in. x 1in. x 26½in. and 1 piece 4in. x 1in. x 26½in. for platform.

3 pieces 6in. x ½in. x 17¼ in. and 1 piece 3in. x ½in. x 17¼in. to form sunken portion of roof.

2 pieces ½in. x ½in. x 19¾in. and 2 pieces ½in. x ½in. x 23½in. for fillet rounded at top to form weathering groove.

2 iron bolts ½in. x 30in. (threaded each end) and nuts for frame.

4 iron washers 2in. x 2in. x ¼in.

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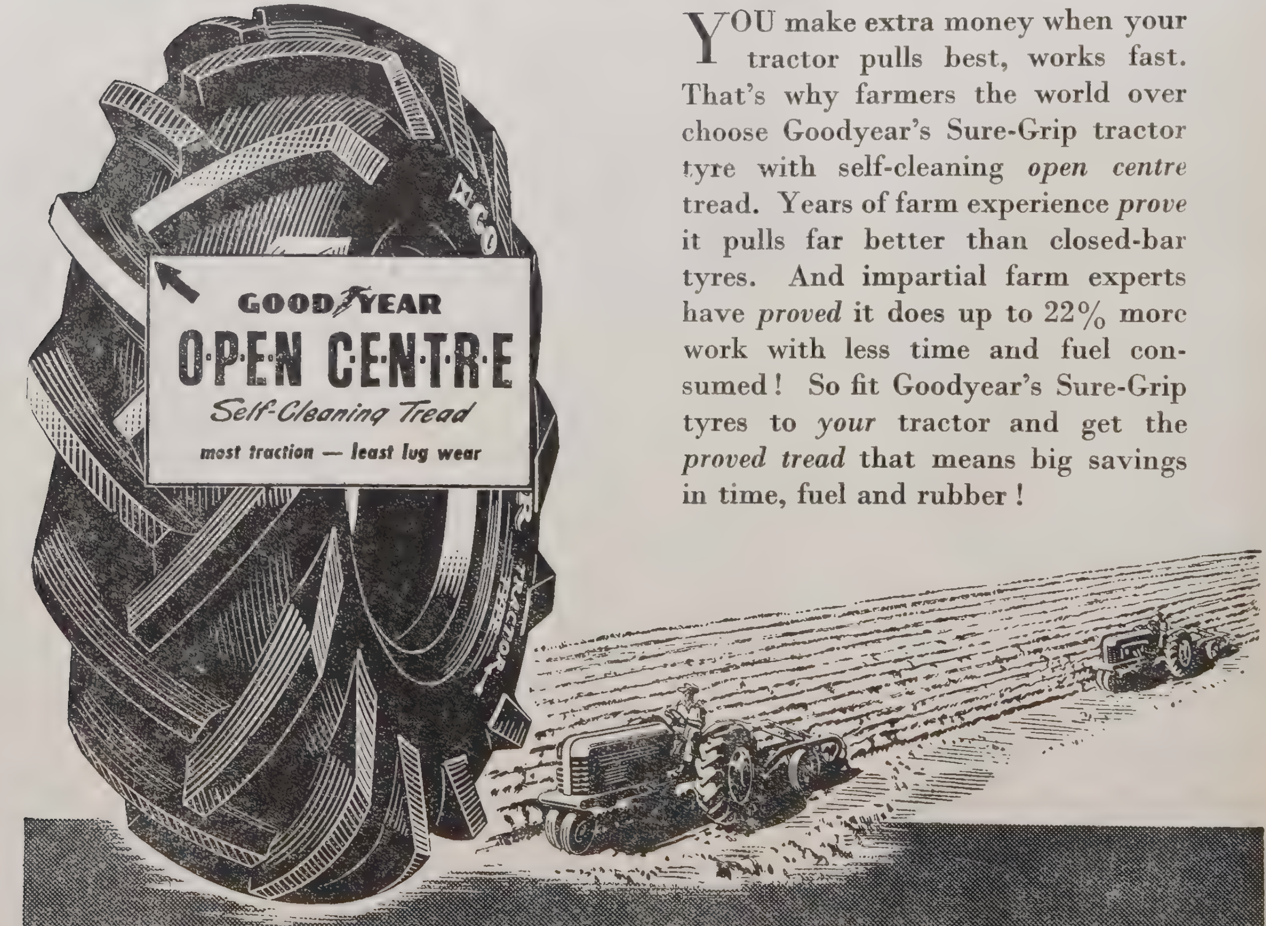
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Culture of Sub-tropical Fruit in New Zealand

By P. EVERETT, *Orchard Instructor, Kaikohe.*

THERE appears to be an opportunity to extend successfully the culture of many sub-tropical fruits, either for home use or commercially, in the warmer parts of the Auckland Province, more particularly along the east coast of the North Auckland Peninsula. Here there are many relatively small areas where frosts generally do not occur, with numerous more extensive areas where the temperature seldom falls below about 28 degrees F.

MANY such sub-tropical fruits are already being grown in a limited number of private gardens, but are not widely known even in the areas where the fruit is being produced every year. These include such delicious dessert fruits as the cherimoya, which is claimed to be one of the three finest fruits grown. The many inquiries concerning them made by enthusiastic gardeners demonstrate the need for publication of all information available on growing sub-tropical fruits, and also a few tropical fruits, in New Zealand.

The growing of such fruiting trees and plants in suitable localities in New Zealand should be encouraged, and the following brief descriptions of the various trees and plants, together with suggestions for their culture and use, may result in a better appreciation of their possibilities and encourage further trials. The order in which the fruits are dealt with is no indication of their relative qualities or suitability.

The Sweet Pepper

Sweet pepper (*Capsicum annuum Linn.*), also known as capsicum, chillies, and bell pepper, is a frost-tender, small, upright, annual, bushy plant that bears good crops of edible fruit. It is indigenous to tropical America and several other tropical lands and is widely cultivated in tropical countries. The numerous varieties grown are all related to the smaller pungent kinds of pepper-chillies used for producing cayenne pepper, but are distinguished from them by being much larger and lacking their pungency.

The fruits of most varieties are oblong, slightly wrinkled, 3 to 5in. in diameter and 4 to 6in. long. When mature the colour varies from deep green to bright red. The fruit contains a firm core to which many hundreds of small seeds are attached and an outer, fleshy, edible portion generally about ¼in. thick. There is a considerable hollow space round the core. The fruit is greatly relished when baked or boiled and used as a vegetable, or served raw in salads, when it should be finely sliced or grated. To prepare it for cooking the outer portion is cut around the stem, and the core, with stem attached, removed. When baked the hollowed fruit is usually filled with stuffing.

The plants, which are raised from seed, thrive in a wide range of soils but give best results in a light, fertile loam.

In the warmer districts of New Zealand the sweet pepper is grown to a limited extent, small quantities being marketed. Several varieties, including Bull Nose and California Wonder, thrive well and produce heavy crops. The plants grow to a height of 2 to 2½ft. and produce about 6 to 10 fruits which, in the main, are 3 to 5in. long with a diameter of 2 to 3in. The fruits of the Californian Wonder mature about 3 weeks earlier than fruits of the other variety and are also larger, factors which make it the more suitable variety for New Zealand conditions. The colour is green, changing to bright red when mature.

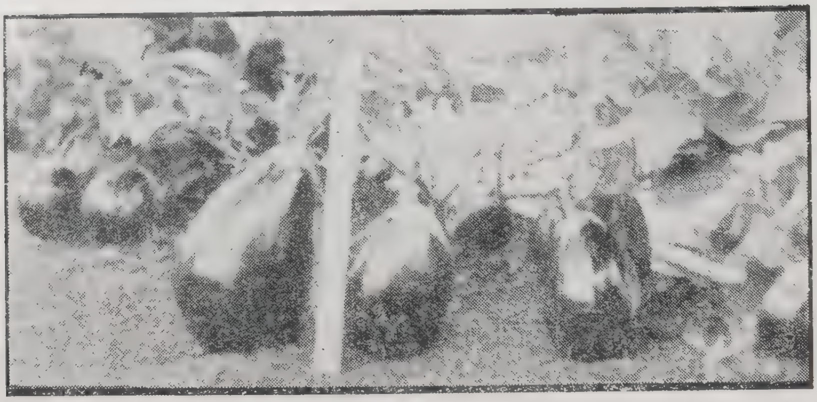
To secure maximum crops the plants should be raised under glass in the same manner as the tomato and planted out toward the end of October in rows 2½ to 3ft. apart with a distance of 2ft. between the plants in the rows. The ground should be kept lightly cultivated throughout the growing period. No staking is required. To ensure rapid plant growth, which is necessary for the production of heavy crops, a liberal application of fertiliser should be worked into the soil before setting out the plants. Blood-and-bone manure applied at the rate of 5cwt. to 10cwt. an acre is recommended.

In most localities fruits commence to mature in March and picking continues until early June unless plants are injured by frost earlier. The fruit is generally harvested when the red colour begins to develop, as it is then considered to be in the best condition for cooking. However, there appears to be no great variation in the quality of the fruit if it is allowed to remain on the plants until fully coloured. Fruits picked when partially coloured will develop the normal full colour in ordinary storage, and will remain in good edible condition for three weeks or longer. The fruit should be marketed in cases preferably of about ½ bushel capacity.

When the fruit is grown outdoors in New Zealand considerable damage is caused by caterpillars tunnelling to the core, causing the fruit to decay. Control measures recommended are spray applications of lead arsenate at a strength of 2lb. to 100 gallons of water at three-weekly intervals from fruit set until the crop has been harvested.

The growing fruit is subject to attack by the fungi *Gloesporium* sp. and *Alternaria tenuis,* both of which first

Mature sweet pepper of the California Wonder variety grown under commercial conditions at Kerikeri.



Egg fruit plant with lower leaves removed.

appear as small circular decayed areas which rapidly extend until the whole fruit is decayed. Plants grown in humid conditions under glass have also become severely infected with botrytis rot (*Botrytis cinerea*), which kills the growing shoots. Control measures recommended are spraying with Bordeaux mixture 3:4:50 at intervals of 14 to 21 days, and removing infection. Where any of these diseases become troublesome in glasshouses the ventilation of the house should also be increased. The tobacco mosaic virus disease has also occurred on sweet pepper when grown both outdoors and under glass in New Zealand, there being a yellow mottling of the foliage and a dwarfing of the plants. Affected plants should be removed and destroyed.

The demand for sweet peppers should greatly increase as they become more widely known. There appears to be no reason why the culture of this most ornamental and palatable fruit on a commercial scale, as well as in domestic gardens, should not be extended in the many areas where the soil and climate are suitable.

The Egg Fruit

Egg fruit (*Solanum melongena Linn.*), also known as egg plant or aubergine, is a frost-tender, low, bushy, annual fruiting plant growing to a height of about 1½ to 2ft. The leaves are relatively large, frequently attaining a length of 1ft., with a velvety appearance on the under surfaces. The smooth, polished, unripe fruit, used as a vegetable, varies considerably in size, colour, and shape according to variety. The purple-coloured varieties are considered to be the best, fruits ranging from 4 to 7in. in length with a diameter of 3 to 6in. Being a vegetable the fruit is invariably cooked. It can be steamed in the same way as the vegetable marrow and served with white sauce, but the flavour is considered to be much improved when the fruit is peeled, sliced, and fried in butter or in batter.

The plants thrive in a rich, light, or sandy soil and in rather hot, dry climates with irrigation, but fair crops of good-quality fruit can be grown on a wide range of soils. To mature satisfactory crops a period of at least six months without frosts is necessary.

In New Zealand a small quantity of the fruit is grown annually commercially, mainly in warmer parts of the North Island. For best results plants should be raised from seed under glass and set out when there is no further danger of frost in well-sheltered situations, the young plants then being about 3in. high. Suitable distances to plant are 3 to 4ft. between rows with 2ft. between plants in the rows. The ground should be kept lightly cultivated throughout the growing period.

A fertiliser mixture of equal parts of superphosphate and blood and bone, applied at the rate of 5 to 10cwt. an acre, should be worked into the soil before setting out the plants. The fruit should be cut and marketed as soon as it is full grown and before it is ripe. In some countries there is an average bearing of 8 to 12 fruits a plant, whereas in New Zealand the crop more often varies from 2 to 4 fruits a plant.

The larvae of the potato tuber moth (*Phthorimoea opercullella, Zeller*) frequently attacks the foliage and tips of shoots, mining the leaves and tunnelling the shoots. Spraying with lead arsenate at a strength of 1½oz. in 4 gallons of water is recommended. The first application should be made a month after the plants are set out and repeated throughout the season at intervals of about 17 days. Any caterpillars seen working between the surfaces of the leaves will not be affected by spraying and should be crushed by hand.

Because of the relatively light crops and the need for well-sheltered situations with favourable soil, there appears to be little likelihood of any great increase in the culture of egg fruit in New Zealand commercially. However, in favourable localities, and especially where there is little danger of late spring or autumn frosts, there should be a place for this attractive vegetable fruit in many home gardens.

The Okra

Okra (*Hibiscus esculentus Linn.*), also known as gombo or lady's fingers, is an erect, annual, pod-bearing plant which is grown throughout the Tropics for its edible, horn-shaped pods. The plant is frost-tender and attains a height of from 2 to 6ft., according to variety and climate. The pods vary in length from 5 to 8in. When young, these are an agreeable mucilaginous vegetable, often greatly relished if boiled and used for thickening and flavouring soups, stews, catsup, and other relishes, or served with other vegetables. As the pods approach maturity they become fibrous and inedible. The best results can be expected in rich soils and in sheltered situations.

In New Zealand a limited number of plants of the two dwarf varieties, Perfected Perkins' Long Pod and Dwarf Prolific, have been grown experimentally at Kerikeri. These plants, although raised late in the season, made good growth and produced fair crops of up to 20 pods a plant. Best results were from the long-pod variety. In the warmer parts of the Dominion there should be no difficulty in growing at least the dwarf varieties successfully. To secure maximum crops the plants should be raised from seed under glass in the same way as the tomato and planted out when danger of frosts has passed, in rows 3 to 4ft. apart with a distance of 2ft. between the plants in the rows. Where late spring frosts are not experienced fair crops can be secured by planting the seed directly into the rows.

The seeds should be planted in clusters of three at 2ft. intervals early in October and when the plants have reached a height of 3in. the clusters should be reduced to single plants, leaving the most vigorous. No staking is required. The ground should be kept lightly cultivated throughout the growing period. Special manurial treatment is not necessary where there is a fertile soil. No diseases or pests have been observed attacking the okra in New Zealand.

In localities generally free from frost for a period of about seven months good crops should be obtainable. Those wishing to increase the variety of vegetables in the home garden should be encouraged to grow the okra. However, further trials are required before undertaking commercial planting.

FARMING IN NEW ZEALAND

Meat, Wool, and Dairy Produce

By **P. W. SMALLFIELD,** *Director, Rural Development Division.*

THE first section of this article reviewing the development of farming during the first two decades of the twentieth century appeared in the August issue of the "Journal." It dealt with the development of improved grassland farming practices and the expansion of the meat industry. This section concludes the survey of the period and describes the development of the dairy industry, the control of animal and plant diseases and pests, and the inspection and grading of produce.

DURING the first two decades of the twentieth century dairy cow numbers increased by half a million and dairy farming developed into a highly-organised and efficient industry. The landmarks in its progress were the development of the efficient handling of milk and cream on the farm and in the factory, the grading of produce, the adoption of labour-saving machinery, improved feeding and breeding of dairy cows, co-operation, and improved transport, particularly the provision of steamships for refrigerated cargoes.

The early development of the dairy industry and its close guidance by the Department of Agriculture have already been described in the article "Refrigeration" which appeared in the June issue of the "Journal." Briefly the Department of Agriculture when it was formed in 1892 took over the staff of the Stock Department and the Agricultural Branch of the Lands Department, the latter consisting of three dairy instructors and one nurseryman. John Sawers, who had previously been a dairy instructor in the Agricultural Branch, was appointed Chief Dairy Instructor, and it was largely due to his efforts that the co-operative system of dairy factory organisation was established and the South Island Dairy Association and later the National Dairy Association were formed.

The first Dairy Industry Act, passed in 1892, gave powers to inspectors, defined the terms "factory" and "creamery," made compulsory the registration of trade marks for butter and cheese exported, and prohibited the use of milk and cream from diseased cows. The Dairy Industry Act, 1894, provided for the compulsory grading of butter and cheese for export and in 1898 a further Dairy Industry Act was passed under which power was taken to remove the control of local milk supply from local authorities and placed it under the control of the Department of Agriculture.

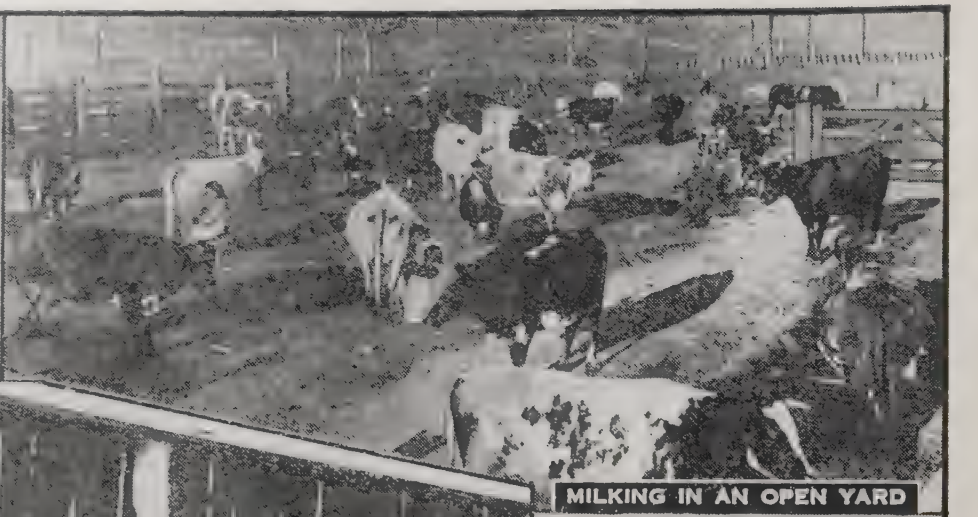
J. A. Ruddick, who was Dairy Commissioner from 1898 to 1900, played a very important part in the development of the Dairy Division. In 1900, when the period under review commenced, T. A. Kinsella succeeded him as Dairy Commissioner. D. Cuddie was Chief Grader and W. M. Singleton Instructor in Cheesemaking. The attention of the industry and the Department was focused on the need to improve the quality and uniformity of dairy produce and the road to progress was not easy. The handling of milk and cream on the farm had first to be improved and the complications introduced by the adoption of home separation and machine milking overcome before factory managers could turn out a uniform high-quality product.

Improvement of Dairy Sheds

One of the first developments in the programme for the better handling of milk and cream on the farm was to improve the standard of milking sheds so that a proper measure of cleanliness could be maintained. The early sheds lacked concrete floors, adequate drainage, supplies of clean water, and water-heating facilities. Departmental dairy inspection commenced with dairy premises for local town supply, and the first move to extend it to factory supply was made in 1908. This inspectional work was short-lived, as it met with serious opposition, but it did eventuate in the present scheme under which Farm Dairy Instructors in co-operation with dairy companies supervise the cleanliness of sheds of factory suppliers.

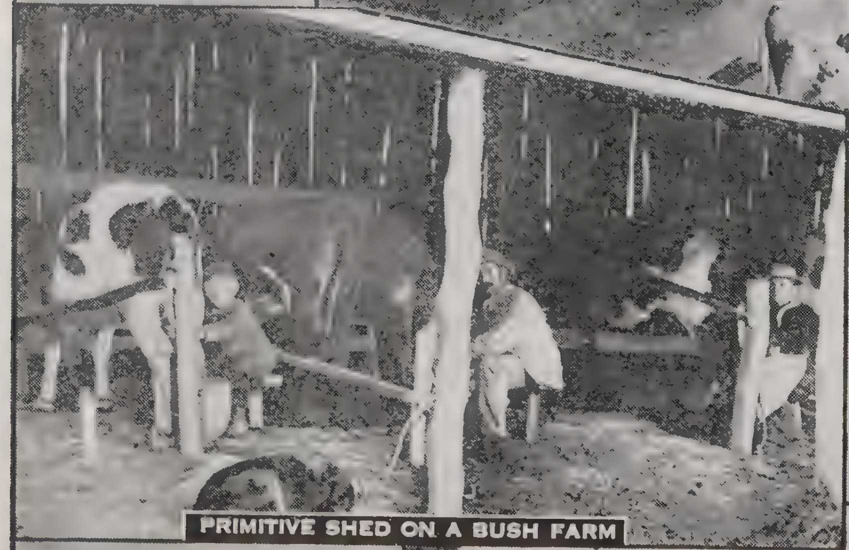
Some idea of the condition of dairy sheds at the beginning of the period may be gained from the following extract of the annual report of the Department of Agriculture for 1900 dealing with town dairies in the Auckland district:—"The sheds as a rule are built entirely of wood, the majority having iron roofs. Most of them are in a fair state of repair, but some are in an extremely dilapidated condition. Some half-dozen dairies possess cowsheds which are nearly perfect, being well situated, lofty, well lit, well ventilated, and having floors either of concrete or brick, so laid that drainage flows away and is taken in underground pipes to a sufficient distance from the building. Most sheds, however, fall far below this standard. Few are so situated as to secure good drainage, many, in fact, being built in hollows, where in addition to their own drainage they get that of the surrounding land. As a consequence of this the yards adjoining the sheds are in a very bad state, and the continual tramping of the cows converts them in wet weather into perfect quagmires, into which the drainage from the shed usually flows. The usual accompaniment of this is a manure heap, which often assumes large proportions. . . . The pitch of the roof is often too low and occasionally a loft situated above the shed reduces the height to under 6ft. The sheds are rarely well lit, there being an almost total absence of windows, but most are sufficiently well ventilated for the purpose for which they are used. Many

DEVELOPMENT OF THE MILKING SHED



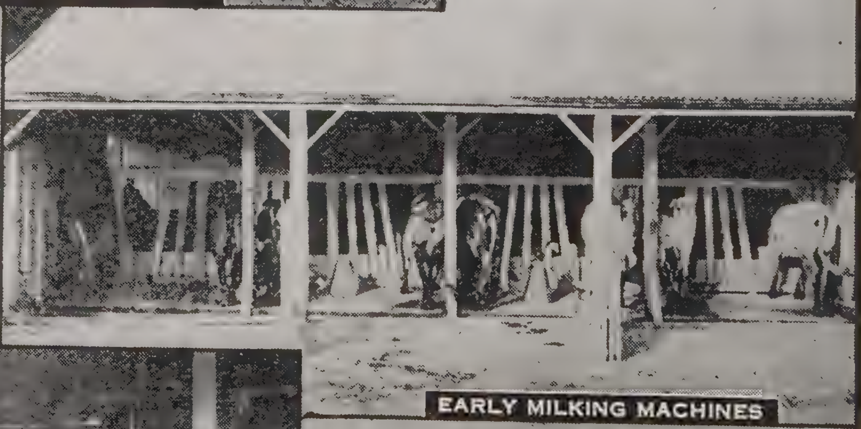
MILKING IN AN OPEN YARD

In the early 1900's only primitive milking shed facilities were available on most dairy farms. "I have seen," said Clifton, "women and children milking in log yards in the early and late part of the season. The misery of it at these seasons is incalculable."

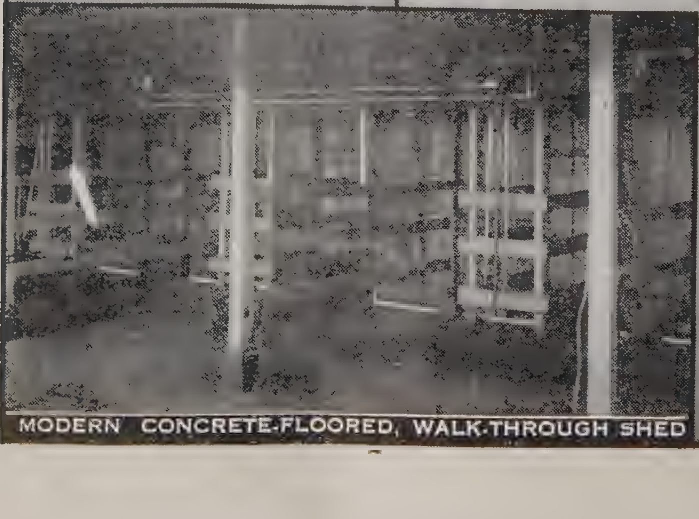


PRIMITIVE SHED ON A BUSH FARM

Milking machines were first imported in 1903 and the illustration shows one of the early machines in a typical wooden-floored shed of that period.



EARLY MILKING MACHINES



MODERN CONCRETE-FLOORED, WALK-THROUGH SHED

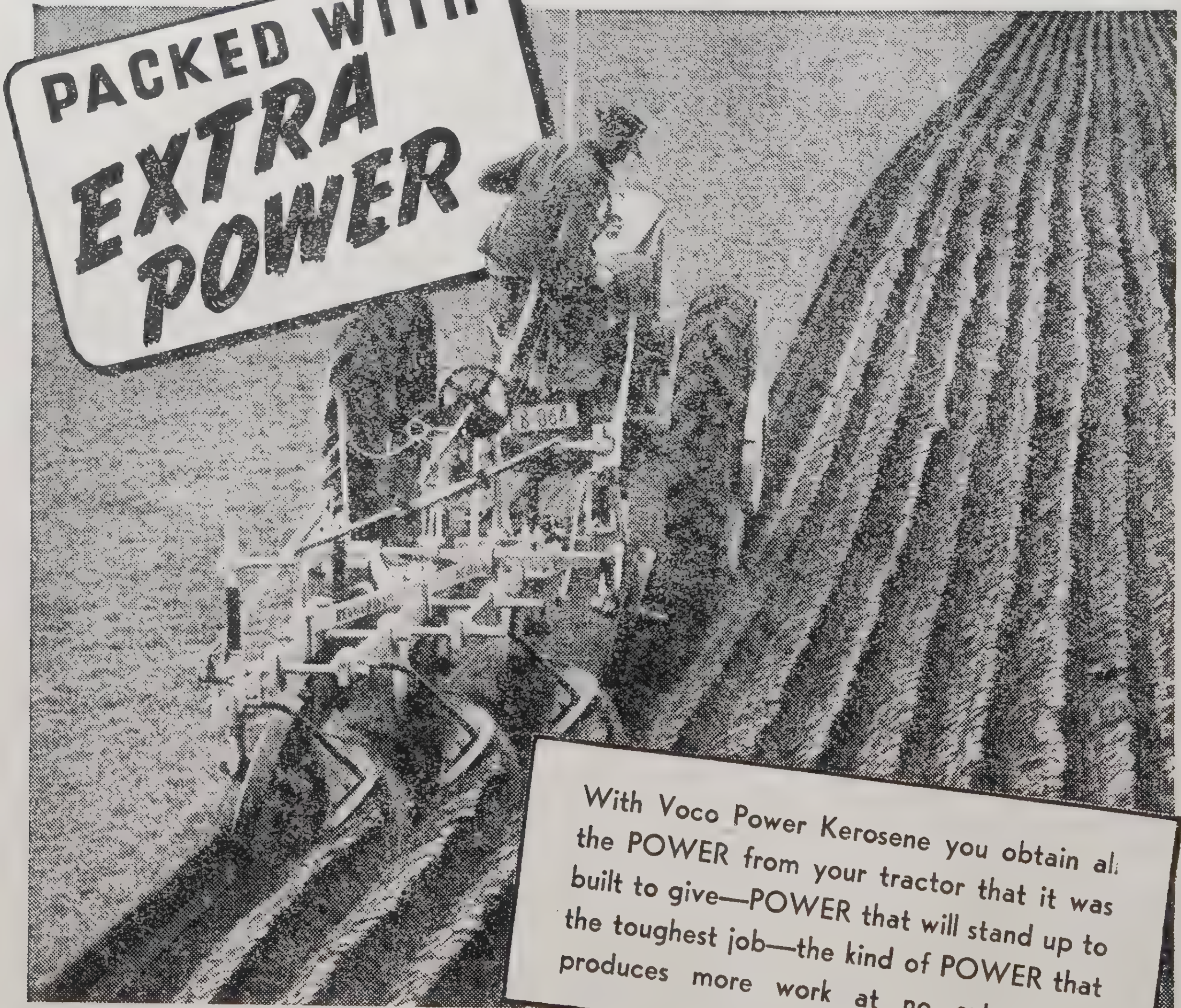
Progress in developing improved sheds was greatly facilitated by rising prices between 1910 and 1920 and the improvement of roads which allowed farmers to cart shingle and put down concrete floors and yards. From 1912 the Dairy Division closely supervised dairy shed development through the issue of standard plans for walk-through sheds and the appointment of Farm Dairy Instructors.

of the sheds are open, and in this climate, taking into consideration the fact that the cows are seldom housed for more than a couple of hours at a time, I think that an open shed is all that is necessary, and indeed to be preferred to the closed variety, as it receives the beneficial effects of an unlimited supply of fresh air and direct sunlight. The benefit derived from an open shed, when situated in the middle of a dirty yard, especially if the yard has a manure heap in it, is neutralised by the filthy suroundings. . . . The floors and drainage are decidedly the worst features of the sheds. . . . Many floors are of large stones very roughly laid or simply of earth. . . . Another form of floor even more objectionable than the last mentioned is the floor formed of earth or large stones to a depth of 3ft. with boards laid above. The excreta soaks into the boards and penetrates beneath them, and it is only necessary to stand on the boarding to prove this, as the weight of the body pressing down on the boards forces the filthy fluid to the surface. . . . Drainage in too many instances is non-existent. In nearly every shed there is a channel a foot wide, laid behind the cows and running the whole length of the shed, and misnamed a drain. The floors of most sheds are perfectly flat, consequently there is no fall and any liquid that finds its way into the channel remains at the spot where it entered until it is either swept away or soaks into the wood of which most of the channels are constructed. . . . The drains have another unsatisfactory feature about them, viz., that after running the length of the shed they end abruptly at the entrance, so that if drainage should reach that point it collects there, which is only a little less objectionable than if it remained in the shed. . . . "

The sheds for factory supply in 1900 were just as primitive as the town dairies and it is no wonder officers of the Dairy Division and others responsible for the manufacture of butter and cheese maintained constant pressure for the improvement of dairy sheds; this was not secured until the Dairy Division issued plans of standard walk-through sheds. The need for shed improvement culminated in the Dairy Industry Act, 1908. The regulations for shed inspection were never brought into force, but much valuable work was done by inspectors who worked without statutory authority. Speaking before the Parliamentary Committee set up to consider the proposed new regulations, Clifton gave the following evidence:—"The supervision of the dairy industry—of the milk supply of the Dominion—was not initiated by the Department itself or asked for by it. It really comes about at the request, repeated for many years, of the leaders of the dairy industry. The immediate beginning of the supervision bringing about these regulations was a request made at the conference of the National Dairy Association at Palmerston North about two years ago. I was asked to attend the meeting, the object of the discussion being to improve the general milk supply. The industry was represented by many of its leaders. They pointed out that in their estimation there was from the manufacturing point of view no great improvement to be made, but their factory managers found great fault with a large proportion of the milk presented to them. The general opinion of that meeting was that improvement should begin at the farm end—that the supply should be under supervision. That, too, was the decision of the meeting, which culminated in the formulation of these regulations. . . . I should feel exceedingly gratified if in five years' time we find an improvement in the general condition of the dairies supplying factories. . . . If these regulations come into force we shall protect 90 per cent. of the suppliers who endeavour to comply with the Act and whom we should endeavour to assist. I have seen women and children milking in log yards in the early and late part of the season. The misery of it at these seasons is incalculable. Is it supposed that regulations—even coming in in their most drastic form—would be applied by anyone with ordinary common sense under conditions which would have the effect of driving farmers off farms? If regulations come before us which may appear drastic, there is a great factor of common sense which prevents their misuse. . . . "

An early dairy herd.

The farm dairy inspection which was then commenced, although without statutory authority, did help to improve shed conditions rapidly. J. W. Deem, stock inspector in charge of the Wanganui district, in his 1909 report states:—"The work of dairy inspection in connection with factory supply was started 12 months ago. Factory managers generally state that there has been a marked improvement in the milk supplied. . . . Most farmers have come into contact with the inspector and have found that his mission is to assist and that from his knowledge of the milk business he is able to do this, and the opinion of fully 80 per cent. of the dairy farmers is that inspection discreetly carried out will be a boon to the industry. . . . On the inspector's first visit to a farm, after introducing himself, he made a careful inspection, taking note of the cowshed, water supply, number of cows milked, area of farm, tenure, etc., and at the same time pointed out what was necessary to make the place sanitary. . . . Subsequent visits were paid to farmers with bad premises or who were supplying inferior milk, and it was endeavoured by advice to show them how to overcome their difficulties without incurring any great expense; and . . . they have been able to accomplish a great deal by having milk stands removed into more sanitary positions, more care taken in cleaning of the cows' teats and milking utensils, and by securing a water supply. During the year over 450 new sheds have been erected. There are now upward of fifteen hundred sheds with concrete floors, while there are signs that the above figures will be more than doubled before next spring. . . . That all this



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could be accomplished in one year without friction . . . speaks well for the progressiveness of the dairy farmer and also for the manner in which the inspectors have gone to work. . . . "

Progress in developing improved sheds was greatly facilitated by rising prices (the pay-out for butterfat first reached 1s. a lb. in the 1911-12 season) and the improvement of roads, which allowed farmers to cart shingle and put down concrete floors and yards. In short, farmers made rapid strides in improving milking shed conditions as soon as they were able to do so, for milking under primitive conditions on earth-floored sheds or yards was most objectionable from the farmer's point of view.

Dairy shed inspection was reorganised in 1912-13, when the first appointments of Farm Dairy Instructors who worked in co-operation with the dairy factories were made. The Dairy Division provided standard plans for walk-through milking sheds and instructions on the proper handling of milk and cream on the farm. By the end of the period under review the standard of milking sheds and cleanliness in the handling of milk and cream on the farm showed a vast improvement compared to 1900.

Milking Machines

The development of dairying on small farms, particularly in the Auckland and Taranaki districts, meant that the farmers' children had to be called on to assist with the milking. This led to the cry of child slavery, as when boys and girls were required to hand milk night and morning they were often too tired to attend properly to their school lessons. Commenting on the child labour problem and the introduction of milking machines, T. A. Kinsella, Dairy Commissioner, stated in his annual report for 1906:—"We have now upward of twenty thousand patrons supplying milk to creameries, factories, and skimming stations in the colony. A large number of those engaged in the production of milk find it difficult at present to secure a sufficient supply of reasonably-cheap labour. The fact also of our now carrying on dairying operations to any extent during the winter months makes it difficult for the average dairy farmer to depend on securing at the beginning of each new milking season a supply of experienced milking hands, even at a very high wage. In consequence of this many of our dairy farmers with large herds are almost compelled at times to work their children harder than should be the case. I am also of the opinion that in many cases more work is demanded of the children than the farmer himself cares to see them doing. While this latter may be true, the percentage of children in New Zealand who are overworked is, in my opinion, from personal experience among a very large number of farms in various dairying districts, very small. . . . As I have already said my sympathies are with the dairy farmer and his children, and I am confident that most New Zealand milk producers are anxious to see the complete success of an absolutely satisfactory milking machine, from a sanitary point of view, as well as one which can be purchased at a reasonably-low cost. . . . The question which then appeals to me is this: Is the introduction of the milking machine going to point in the direction of giving our factory managers that much-talked-of and very necessary cleaner raw material or purer milk supply? We, as instructors at factories and among the dairy farmers, have for years been endeavouring to improve the milk supply and the quality of produce by introducing new methods and by advocating cleanliness. We have also been endeavouring in every possible way to do away with the system of pumping milk and cream through closed-in pipes at factories. This being so, when the milking machine with its many little corners which are difficult to keep clean and sterile is introduced into careless hands —which latter is bound to be the case at least in many backblock districts —it will cause an inferior quality of milk to be delivered to our factory managers, instead of clean milk or milk free from injurious bacteria. . . ."

A pioneer's home in the heart of the bush.

The Lawrence-Kennedy machines invented in 1902 were the first to provide a satisfactory milking unit. These machines were imported from Australia in 1903 and one machine imported in that year was tried out at Ruakura. Early opinion favoured machine milking, and the Department of Agriculture's annual report for 1904, in a description of the Ruakura trial, stated:—" . . . After a season's work it affords the greatest pleasure to give the machine unqualified approval; it is reliable, it eliminates the undesirable employment of women and children, it reduces the labour required and warrants the payment of higher wages, and it is far more comfortable for the cow than hand milking. . . . " The Dairy Division, however, soon discovered that through the practical difficulties of thoroughly cleaning the machines, the quality of the milk from machine-milked cows was generally unsatisfactory. Singleton in 1908 reported:—" . . . Although the milking machine, if properly cleaned, will produce good milk, still at present it seems to be too difficult for the average dairy farmer—and even the dairyman above the average—to keep the machine in a condition sufficiently clean to be compatible with the production of sound-flavoured milk."

Gradually machines were improved in design so that all parts could be readily taken down and cleaned and routine washing and care of machines systematised, till at the end of the period there was a very general change-over from hand to machine milking.

Improvement in the reliability of the internal combustion engine through the introduction of high-tension magnetic ignition and the modern carburettor and the shortage of labour and higher prices for produce during the First World War and the years immediately succeeding it all helped to hasten the adoption of machine milking in the later years of the period under review. In 1921 there were 10,450 milking machines in use in the Dominion and just over 50 per cent. of the dairy cows were milked by machines.

Home Separation

A controversy about home separation began very early in the development of the dairy industry. The Dairy Division and factory managers opposed it in the earlier days on the grounds of the quality of the product, which is not surprising considering the then generally unsatisfactory condition of the milking sheds and standards of cleanliness. The official opinion as recorded in the Department of Agriculture's annual report for 1900 was as follows:—"Where the roads are impracticable for hauling milk or the supply available in any district is not sufficient to support a factory or skimming station, the home separation plan affords a temporary means of assisting settlers to build up their dairies and dispose of the produce until such time as the factory or skimming station can be started. The factory plan, however, is so much better for the general welfare of the dairy industry, as well as the individual, and there should be no competition between the two."

Transport difficulties, particularly in the northern districts, really decided the issue, for without good roads home separation was the only method of supply open to many farmers. Over large parts of the North Auckland and Auckland Land Districts home separation and the transport of the cream to the factory by rail, launch, or coastal boat became normal dairying practice, and it was not until the late 1920's that road communication was reasonably good in many districts.

Edward O'Meara's Jersey cow Sultan's Daisy, who in one lactation recorded 13,502.7lb. of milk containing 968.22lb. of butterfat.

Home separation created many difficulties for factory managers and the officers of the Dairy Division, but those were eventually overcome. The factory had to organise the collection and handling of the suppliers' cream cans and provide a system of can marking and washing, sampling, grading, and testing. Infrequent delivery at the beginning and end of the seasons and the generally poor quality of cream which had to be carried long distances had to be met by changes in factory practice; high temperature pasteurisation, neutralisation, cooling, and low-temperature churning had to be introduced to handle home-separated cream, and the net result has been the development of a neutral-flavoured butter.

Improvement in Feeding and Breeding Dairy Cows

The expansion of the dairy industry between 1900 and 1921 was due both to an increase in the number of cows milked and an increase in production per cow through the development of better feeding and breeding practices. The rise in cow numbers and the development of the export trade in butter and cheese and other milk products are shown in Table X below.

E. Griffiths's well-known Jersey bull K.C.B., imported to New Zealand in 1902, the productive capacity of whose progeny and that of another English-bred bull imported at the same time, Silver King, was largely responsible for the early advance of the Jersey breed in New Zealand.

Various factors influenced trends in the production of butter, cheese, and other milk products. As roads were improved cheesemaking became increasingly important in Taranaki, while the expansion of dairying in Auckland was developed round home separation and buttermaking. In the years of the First World War increasing attention was paid to the manufacture of dried milk and other processed milk products.

In 1900 neither the carrying capacity per acre nor the butterfat production per cow was very high. Generally dairying grassland had a carrying capacity of about 1 cow to 4 acres and annual cropping was necessary to provide supplementary feed. Carrying capacity did not improve until toward the end of the period, when topdressing improved the quality and lengthened the growing period of the pastures. Small 50-acre farms which entered dairying in the early part of the period with a hand-milked herd of 12 cows were gradually worked up to a carrying capacity of 18 to 20 cows at the end of the period.

The estimated average butterfat production per dairy cow (both in milk and dry) in the 1900-1901 season was 123lb., in the 1920-21 season it was 154lb., and for this season the estimated production per cow in milk was 174lb. Over the period there was roughly a rise of between 25 and 30lb. of butterfat production per cow.

J. Donald's Westmere Princess Pietertje, who in one lactation yielded 24,199lb. of milk containing 939.78lb. of butterfat.

When dairying began most of the cows were Shorthorn or Shorthorn cross, but gradually between 1900 and 1921 the Jersey gained ground, and by 1921 about 30 per cent. of the cows were Jerseys or Jersey strain. The gradual ascendancy of the Jersey was due to three chief causes—its early maturity, its high butterfat production, and to the wise use of pre-potent butterfat bulls in the formative period of the industry. The early advance of the breed was largely due to the productive capacity of the progeny of two English-bred Jersey bulls—K.C.B. and Silver King—which were imported into New Zealand in 1902. K.C.B. was registered by Geo. Guild, Christchurch, and Silver King by J. Stuckey, Wairarapa. Both breeders interchanged the services of these two bulls and it was when mated with the daughters of Silver King that K.C.B. produced some of his best stock. K.C.B.'s influence in raising the production of New Zealand jerseys was continued by his son Grannies Knight. Other important bulls imported in this period

TABLE X—NUMBER OF DAIRY COWS AND EXPORTS OF BUTTER AND CHEESE AND OTHER MILK PRODUCTS, 1901 to 1921.

Year	Number of dairy cows	Exports		
		Butter Cwt.	Cheese Cwt.	Other milk products lb.
1901	271,495	201,591	104,299	945,772
1906	409,916	320,225	131,206	484,493
1911	460,709	302,387	439,174	281,527
1916	569,148	358,632	948,416	1,435,283
1921	762,504	898,478	1,368,784	22,406,122

were Eminents Fontaine and Majestys Fox 1908, Soumise Majesty 1910, and Roberts 1911.

The Jersey Cattle Breeders' Association was formed in 1902, the Ayrshire Cattle Breeders' Association in 1909, the Holstein Friesian Association in 1910, and the Milking Shorthorn Association in 1913. All these associations exerted their efforts to improve the standard of dairy cattle, and the type of cow milked was gradually improved by grade breeding.

Organised herd testing was inaugurated in 1909 by the Dairy Division, when it established an association at Dalefield in the Wairarapa in co-operation with the suppliers of the Dalefield Dairy Factory. This was followed by the establishment of certificate of record testing of pedigree cows by the Dairy Division in 1912. Organised herd testing did not assume real importance, however, until after 1922, when the system was widely extended through the adoption of group herd testing. In the 1921-22 season 4 per cent. of the total dairy cows and 4.5 per cent. of the cows in milk were being tested.

General Farming and Factory Progress

The expansion of the dairy industry was greatly assisted by the rising prices during the 1900-1921 period; the value of dairy exports in 1901 amounted to £1,161,815, and in 1921 had risen to £20,597,982. The first pay-outs of 1s. a lb. for butterfat were made in the 1911-12 season and pay-outs gradually increased until 1920-21, when the Imperial purchase price for butter was 280s. a cwt.

These unprecedentedly - high prices were reflected in inflated land values, and while this phase is remembered, it should not be forgotten that the gradual rise in prices over the period gave the dairy farmer the money to buy fertiliser for topdressing, to build sanitary sheds, to purchase good bulls and milking machines, and to provide all other improvements so necessary to increase the efficiency of farms. By the 1920-21 season there were about 44,000 suppliers to dairy factories, 72 per cent. of the farms were equipped with separators, and 53 per cent. of the cows were milked by machines.

While such developments as home separation had to be met by some reorganisation of factory methods, the requirements of the factory manager for the proper handling of milk and cream on the farm were gradually met. To encourage further improvement in the handling of milk and cream on the farm a system of cream grading was gradually introduced, first in 1910 by the Oruru-Fairburn Dairy Company and later by a group of dairy factories in North Auckland in 1914. Relative prices were fixed for first- and second-grade cream, the difference being about ¾d. per lb. butterfat. The practice gradually spread to other districts, but was not made compulsory until 1926.

The range of dairy produce manufactured was widened during the period. Nathans began the manufacture of dried milk at Makino in 1901, the first casein factory commenced operation in 1912 at Papanui, a sugar of milk factory was erected at Edendale in 1914, and the manufacture of skim-milk powder began at Waharoa in 1920.

D. Cuddie, Dairy Commissioner, Department of Agriculture, 1906-21

In this formative period the dairy industry was well served by many men of ability and enterprise, not only on the technical side of manufacture and farm production, but also in the business and co-operative spheres. Certain names must be mentioned, but these are only a very small percentage of the many who rendered the industry good service.

The Dairy Division of the Department was led by J. A. Kinsella for the greater part of the 1900-1906 period; he was succeeded by D. Cuddie, who filled the office of Dairy Commissioner between 1906 and 1921. He built up the instruction and grading services of the Department and guided the industry through the difficult days of the First World War.

In the field of developing the co-operative system of factory production and in the business of marketing and general improvement of the industry the contributions made by the following men were very important:—Henry Reynolds, Wesley Spragg, and William Goodfellow in developing dairying in the Waikato and in the formation of the New Zealand Co-operative Dairy Company; the firm of Joseph Nathan and Company Limited in expanding the trade in dairy produce and developing dried milk production, and J. G. Harkness and Arthur Morton in the development of the National Dairy Association. These and many other men gave direction and encouragement to the industry through the difficult formative years and laid the foundations of the present efficient dairy farm and factory production.

Fruit

The fruit industry, particularly apple production, expanded considerably between 1901 and 1921. Exports of fresh fruit rose from 24,000lb. in 1901 to 2,000,000lb. in 1921. Commercial orcharding was widely advertised as an attractive industry, and land companies were formed to carry out planting and establishment work. Unfortunately many of these company-planted orchards were placed on land of low fertility. In New Zealand the prices of animal products determine land values, and because the country produces animal products from grass without great effort in terms of man-hours per pound of meat or butterfat, the price of land suitable for orcharding tends to rise above the level at which land can be purchased and developed for orcharding, taking into account the time and capital required before the orchard reaches full bearing. Accordingly prospective orchardists and orchard development companies turned their attention in many areas to land that then had little or no prospective value for grass farming. For instance, an Orchard Instructor commented as follows after the passing of the Orchard and Garden Diseases Act, 1908:—"Now, with the reasonable protection provided by law, I anticipate a more rapid expansion of the industry than has yet been experienced. This should apply especially to the Auckland Province, where the nature and quality of much of the land render it less suitable than that in other parts of the colony for general agricultural purposes, yet in such a favoured climate as the north possesses, that land has proved to be well adapted to fruit culture. In fact . . . much of the north, when the timber and gum have been removed, appears to be suitable to provide a home for those who have neither the capital nor the inclination to embark upon agricultural pursuits on a large scale, but would be content to make a living on a comparatively small block of land by the cultivation of fruit. . . ."

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Dogs are our faithful friends, yet about 50,000 country dogs in New Zealand are infected with Hydatid tapeworms whose tiny eggs are passed on to human beings and stock animals and may develop into dangerous cysts.

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Dogs do not grow cysts; they merely carry the worms whose eggs are scattered by the million in their droppings. These droppings dry, crumble, and the eggs are blown about as dust. This dust gets on to pastures and infects sheep and cattle, and on to the coats of dogs, and so on to human hands.

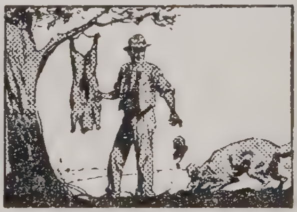
These invisible eggs may thus get into the system, burrow through intestine walls into the bloodstream and so to liver, lungs, and even to heart and brain, where they may grow for years into dangerous cysts that can only be removed by operation.

This disease is a serious one, and can be stopped by these precautions:

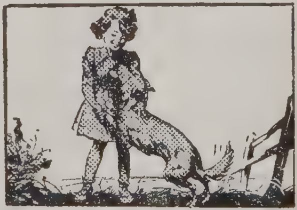
- After handling animals, never put hand to mouth without washing. Children should wash hands before every meal.
- Wash carefully all vegetables eaten raw.
- Never throw raw liver or lungs of sheep to dogs. Cut offal into slices and boil first. Otherwise burn or bury it.
- Dose your dogs with a vermifuge every three months and expel the worms. Arecoline is supplied for this purpose; it can be obtained with your dog licence.

DOSE YOUR DOGS REGULARLY

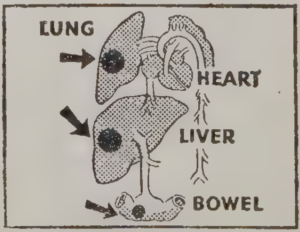
Don't feed them raw offal!



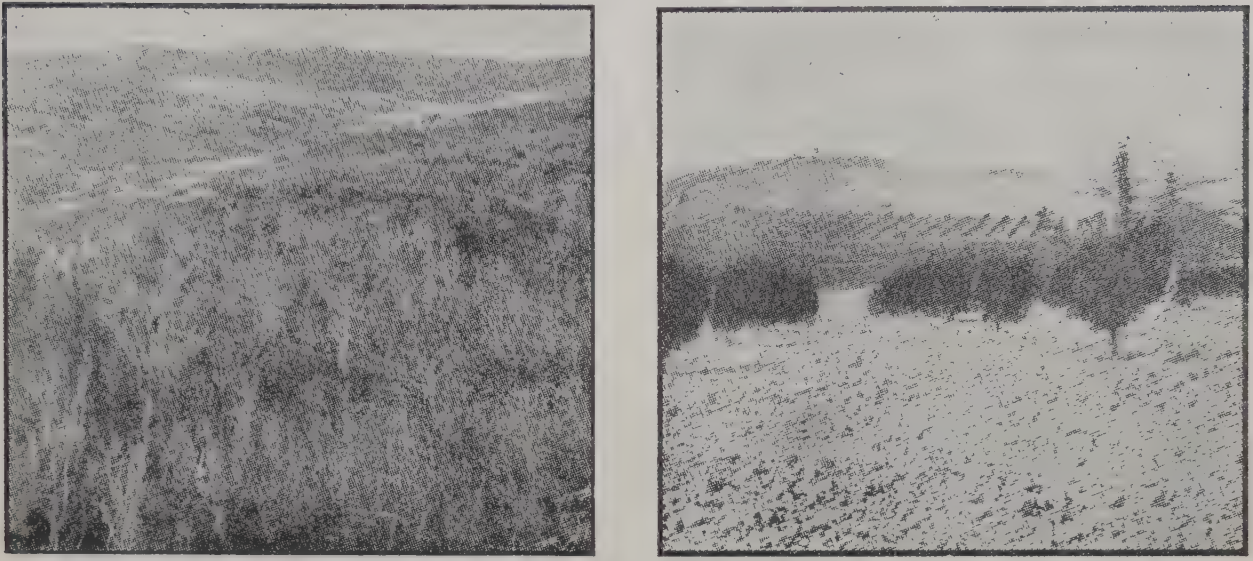
Dog eats raw offal, becomes infected with hydatid worm.



Invisible eggs from dog's dusty coat get on to child's hand and thence to mouth.



Eggs may lodge in human body for years, grow into large cyst.



Left—Moutere land in its original state. Right—The same country showing first-, second-, and third-year trees, with the Department of Agriculture's testing acre in the foreground.

then available, were accordingly taken up for fruit growing. The gumlands of North Auckland and the Moutere Hills of Nelson were the scenes of considerable orchard development in this period. There was no doubt that good fruit could be grown on these soils, but it was not then realised that the yield per tree and per acre would be low. Cultivation, pruning, and spraying costs are much the same whether a high or low yield per acre is secured, and these costs proved excessive for many on orchards established on low-fertility land between 1905 and 1920. On the other hand, orchards planted on fertile land have remained profitable.

Disease Control and Research

Livestock and plant disease control and research assumed increasing importance as the meat, dairy, and fruit industries developed. In each industry little was done to secure a sound and graded product until the export market demanded such action.

The immediate cause of the expansion of the Veterinary Division was the passing of the Slaughtering and Inspection Act, 1900, which provided for the regulation of slaughtering and meat inspection in all export slaughtering houses and public abattoirs. In 1893 the Department of Agriculture had engaged J. A. Gilruth and J. R. Charlton as Veterinarians to commence an organisation to control livestock diseases. The Veterinary Division was established in 1897 and Gilruth was appointed Chief Veterinarian. After the passing of the Act of 1900 he increased the staff of his division and organised an efficient meat inspection and veterinary service. This was no easy task, for at that time farmers generally were not impressed with the necessity for disease control, and the success of Gilruth's work was due to his high professional qualifications, his organising ability, and above all to his authority and influence among farmers. He had the ability to talk and write in a way that both informed and stirred his audience, as is made plain in the following extract from a speech he made to a conference of farmers in 1903. After dealing with the common diseases which were causing trouble, he stated, "You will have observed that in the main I have invoked the stock owner to help himself, feeling that therein lies his safety rather than in the exercise of plenary powers by the inspectors. True, in such instances as strangles and tuberculosis I am of opinion that the assistance of some compulsion is desirable, yet even in these diseases I have much more faith in the common sense of the farmer than in the dubious logic of the law. Educated regarding the possible gravity of the situation, I believe that the farmer would do all that is necessary without compulsion. But, absolutely in the matter of the other diseases I have mentioned, the power of preventing further trouble to yourselves and the generations succeeding you rests with you, and no scheme of compulsion can ever aid you if you are not desirous of helping yourselves.

"And after all, what do I suggest? Simply the most ordinary precautions. Take the present daily routine of the shepherd outside of docking, shearing, and mustering. What does he do? Attempt to find the mother of a forlorn lamb? Rarely. Attempt to assist a labouring ewe? Fortunately seldom. Attempt to heal a sick sheep? Never. True he skins the dead and so aids the dogs and vulture hawks in spreading the germs of disease, for he never burns or buries the dead, but leaves it a testimony to the carelessness of the colonial farmer and a pestilential nuisance to the passing wayfarer. . . . Where fire cannot be utilised in dealing with a carcass use the spade, which I am inclined to think would be a more useful implement for the shepherd to carry than some he burdens himself with at the present time. . . . "

Control was becoming just as necessary with plant as it was with animal diseases. In the early days of settlement fruit trees flourished almost everywhere and were free from disease and insect pests, but gradually pests became prevalent and the Biology and Horticulture Division of the Department of Agriculture was organised to deal with them and educate farmers to use control measures. The first legislation (the Orchards and Gardens Pests Act, 1896) dealt only with the control of the importation of diseased fruit, and except for provisions to prevent the spread of phylloxera, did not cover the control of plant diseases or pests. Until commercial orchardists demanded action little interest was taken by the average farmer in the control of plant diseases. An unsuccessful attempt was made to pass a control Act in 1900. In 1901 T. W. Kirk, biologist, reported: " . . . The apathy shown by growers generally to the spread of orchard pests is amazing. A few who are working on commercial lines recognise the hopelessness of their being able to cope with the different pests unless all are com-

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pelled to take simultaneous action. . . ." Finally a new Orchard and Garden Pests Act which came into operation in 1904 provided for the control of disease in marketed fruit. In commenting on the Act, Kirk stated: "It will probably be the third year before the measure will be enforced in its entirety. That is, any person who shows that he is endeavouring to do a fair thing in the direction of controlling pests will be leniently dealt with, but those who neglect their trees or who persist in marketing diseased fruit will be compelled to respect the interests of neighbours and either clean their trees or cut them down. . . . "

With the development of the Biology Section, first under T. W. Kirk and later under A. H. Cockayne, and with the establishment of experimental orchards and gardens, a great deal of research and experimental work was carried out and control measures formulated for the guidance of orchardists and gardeners.

Research and Instruction

Although the development of an inspectional service was necessary to safeguard animal and plant production, the main work of the Department of Agriculture centred round research and instruction. A chemical section under B. C. Aston was established in 1899 to service the Dairy and Veterinary Divisions, and the Wallaceville Veterinary Laboratory was established in 1905. The Biology Section greatly widened its sphere of work after A. H. Cockayne assumed control in 1909, and it was the team of workers he then collected who were to play so important a part in the development of improved grassland practices subsequent to the First World War.

The large experimental farms established by the Department of Agriculture during the first decade of the century were loosely integrated with the research and instructional services which led to the gradual establishment of the service of instruction based on accurate information which became so important a factor in the development of better farming, and fulfilled J. D. Ritchie's original aim in 1892 that "With the constitution of the Department of Agriculture a policy of instruction and encouragement in the development of the agricultural resources and industries of the Dominion should be instituted. . . . "

"The Journal of the Department of Agriculture" first appeared in June, 1910, and replaced the Department's annual report as a medium of contact with farmers, and has justified the Hon. Thos. Mackenzie's statement in his introduction to the first issue that "This 'Journal of the Department of Agriculture' of New Zealand is presented with the assurance of welcome." The first volume indicates the wide scope of the Department's activities. The development of improved grasslands, fodder crop and cereal production, fruit and vegetable culture, and the control of animal diseases were the main topics in the first volume. Certain problems, such as the development of pakihi lands, grass-grub damage to pastures, and facial eczema in sheep, which have not yet been solved, were also reported on.

Apart from the great value of the "Journal" in disseminating useful information to farmers, it has formed the basis for the development of New Zealand's own farming literature. Before the issue of the "Journal" the formal teaching of agriculture was largely based on British and United States text books, but gradually New Zealand has developed through the "Journal" its own authoritative books and bulletins on farming.

Noxious Weeds and Rabbits

Noxious weeds and rabbits continued to vex the farmer and the Department of Agriculture throughout the period concerned. With the rapid development of the surface sowing of hill country, often with cheap seed mixtures containing a large proportion of weed seeds, and with the aftermath of the excessive cropping of arable land in the '80's and '90's, weeds began to present a problem. Popular opinion claimed that progress in eradication could best be made by preventing weeds from seeding. Although this was feasible with many weeds on closely-settled and highly-cultivated land, it was and still is often quite impossible on large areas of grazing country. Weed suppression normally requires either the introduction of plants which will destroy the weeds by competition (blackberry will not survive on highly-farmed grasslands) or the use of grazing animals which will eat the weeds (goats for blackberry suppression on the poorer pastoral areas or sheep for ragwort). However, the strong public desire for immediate action led to the passing of the Noxious Weeds Act, 1900, which aimed particularly at the suppression of blackberry, Californian thistle, sweet brier, and in certain places Bathurst burr, broom, giant burdock, gorse, hakea, ragwort, and other weeds. The Act provided for the annual trimming of hakea, gorse, and broom hedges and the destruction of cuttings along with any sweet brier or blackberry plants in the hedgerow. Weeds present but not in the fences had to be cleared at an annual rate of a quarter of a chain on either side of all fences. The Act also provided for the cleaning of threshing mills and the suppression of the sale of noxious weed seeds; uncleaned seed could be sold only to buyers who were aware of their condition.

The administration of the Act helped to check weeds on closely-settled land, but could do little to suppress them on rough grazing land, where the work was beyond the powers of the settlers. The position was well summed up by Clifton in his annual report for 1905: "The administration of this Act is probably one of the most difficult duties that ever involved a department. Fertile lands are worth clearing, but poor lands do not warrant the expenditure; in many cases they have become the property of those without means to improve them or, as often happens, they have impoverished the owner. Then comes in the hard fact that there is no money to pay for the clearing. Again on large holdings where weeds are prevalent, as is ragwort, on hundreds of acres, the same with blackberry and Canadian thistle, how can this Act be carried out when one year's work, that is only a palliative, a merely temporary relief, would in many instances amount to more than the value of the land. . . . "

Improvement in the methods for the suppression of many weeds has since come about by the development of closer-swarded pastures and grazing methods and on highly-farmed land by the use of chemicals. The fact is that the farmer must in the main seek the aid of animals and plants to suppress weeds rather than rely on hand clearing. This is so obvious with the native weeds of New Zealand, which are as important as introduced weeds, that no noxious weed Act has been applied to manuka, bracken fern, hard fern, or bidi bidi. For the control of these weeds reliance must be placed, as it has in the past, on the development of vigorous pastures and judicious grazing management.

The problem of the rabbit pest continued to exercise the minds of both settlers and administrators. The Rabbit Nuisance Acts of 1882, 1886, 1890, 1891, and 1901 provided for administration both by the Crown and by boards. Though aiming essentially at the destruction of the pest by the settlers whose land was infested, they also provided for encouragement in the erection of rabbit-proof fencing to prevent the spread or re-invasion of properties by the pest and for the protection of the natural enemies of the rabbit. However, the conflict of interest between the respective claims of rabbit skins and wool continued throughout the period, as it continues today. Rabbit skin exports at five-yearly intervals between 1901 and 1921 are given below:—

Year	Number	Value £
1901	7,112,008	57,046
1906	5,454,738	50,686
1911	7,455,288	76,712
1916	5,896,410	76,405
1921	13,922,446	448,180

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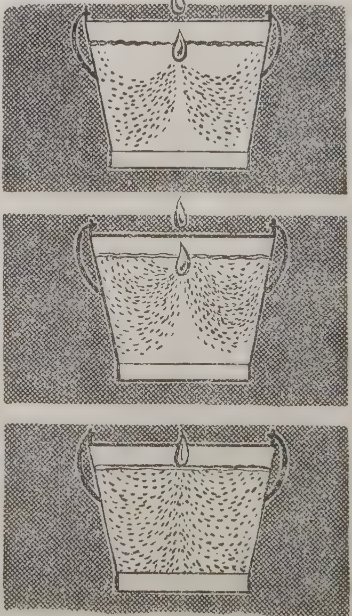


The phenomenal rise in 1921 was due to the aftermath of the First World War, during which lack of labour led to an increase in the pest and high prices for skins afterwards encouraged trappers. Vigorous action reduced the pest in many North Island districts, but in the profitable trapping areas of the South Island not a great deal of progress was made.

Grading of Produce

Grading and standardisation are the first principles of modern commerce, for they are a guarantee in the buying and selling of goods that they are true to description. The initial developments in the grading of wool, meat, and cereals were performed by the commercial firms handling these products, but with the development of the dairy, phormium, fruit, and honey exports, the State had to interest itself in the matter. Uniformity of quality could not otherwise have been obtained because of the number of small processors who were engaged in handling the products.

Apparently, however, the initiators of dairy produce grading did not have in mind that grading would lead to standardisation and that a grade certificate would become the basis on which the business of sale and purchase would be arranged; they looked on it as a means of detecting faults in manufacture and as a guide to factory managers.

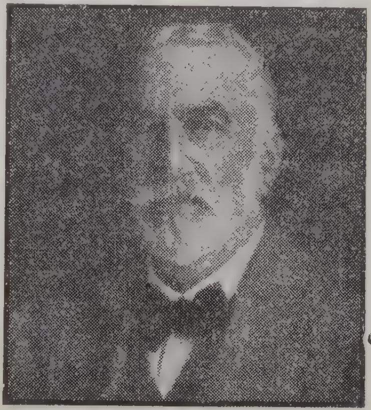
The Dairy Industry Act of 1894 provided for the compulsory grading of all butter and cheese for export; butter grading began soon after the passing of the Act, but cheese grading did not operate fully until six years later.

The principal provisions under the Act relating to grading were:—

1. The proclaiming of cool stores at Auckland, Wellington, Lyttelton, Port Chalmers, and such other places as might be considered necessary.
2. The appointment of graders.
3. The inspection of each lot of butter and cheese intended for export and the grading and marking of each package according to grade.

Philpott in his "History of the New Zealand Dairy Industry" states, "To begin with the proposal had very few advocates, and numerous reasons were advanced against its success by unfavourable critics who could see nothing to warrant the step being taken. The argument which appears to have carried most weight was the one that it took our produce at least six weeks to reach its destination and that marked changes were likely to occur between the time of grading in New Zealand and delivery to the consumer, thus rendering the grade stamp useless as an index of quality. However, the then Secretary of Agriculture, Mr. J. D. Ritchie, foresaw the benefits to be derived from the systematic classification of dairy produce, and persistently recommended its introduction. In spite of the opposition and adverse criticism, the work was eventually undertaken with the sanction and strong support of Sir John McKenzie, then Minister of Agriculture. To induce the smooth working of the scheme an enactment was introduced providing for free cool storage of butter so as to assist the industry. Gradually those engaged in the manufacture of dairy produce began to recognise the advantages of the system, and in a few years a noticeable improvement was manifested in the quality and packing of produce forwarded for shipment.

"A copy of the grader's certificate is attached to the bill of lading for the use of the banks. This recognition gave to the certificates the significance of a commercial document, and such they are now held to be. Copies of grade notes regularly accompany the usual papers forwarded to the purchasers of butter and cheese outside the Dominion. The greatest value of the system as originally intended is still in the effect it has in maintaining and improving the standard of quality. . . . "



[*Hardie Shaw photo.*

Sir James Wilson.

Farmers' Organisations

From almost the earliest days of colonisation farmers set up local organisations for holding shows and discussing farm problems. The earliest society was probably the Auckland Agricultural and Horticultural Society founded in 1844. Agricultural and Pastoral Associations became quite numerous in the sixties, but these societies did not represent farmers as a group and their main activity was an annual livestock show.

With the modern tendency to bring together all interested in each section of production, as evidenced by trade unions, there arose the feeling that farmers ought to form an organisation to present their views to the community. A. G. C. Glass, of Hokianga, managed to form a group of farmers into a union at Kaitaia in 1899, and in his post of organising secretary he was responsible for the formation of many similar groups in the Auckland Province, all of which were represented in a conference held in Auckland in 1900. Once Auckland had its union established he turned his attention to the South Island, and by 1902 had managed to arouse such interest in his ideas that branches were formed throughout the country and were banded together in a national organisation known as the Farmers' Union. The first Dominion President elected in 1902 was Mr. (later Sir) James G. Wilson, who held office until 1920. In his term of office the union grew in strength and influence and became the spokesman for the man on the land to the Government and the community generally.

General Progress 1901-21

"The Settler's Handbook of New Zealand" (1902) enumerates the Crown lands open for selection at nearly 3,000,000 acres, of which ¾ million acres were surveyed and 2¼ million acres unsurveyed. In addition the State was active in purchasing large freehold estates in the more fertile districts and offering them for closer settlement. The first two decades of the twentieth century were ones of very active settlement, and the general development of farming is summarised in Table XI.

TABLE XI—LAND UNDER OCCUPATION AND LIVESTOCK 1901 AND 1921.

	1901 acres	1921 acres
Land under occupation:		
Improved land ..	13,177,261	18,159,829
Unimproved land ..	22,330,627	25,386,928
Total area occupied	35,507,888	43,546,757
Livestock:		
Cattle	1,256,680	3,139,223
Sheep	20,233,099	23,285,031
Pigs	250,975	349,892

The most active development was in the North Island, where sown grasslands increased by 4 million acres, sheep by 2½ million, and dairy cows by ½ million.

Expansion of the area of farm lands and number of livestock was only one factor in increasing trade and employment. Equally important was the development of roads, bridges, railways, harbours, and industries. Population increased by half a million and the larger labour force stimulated both farm and industrial development, especially those industries processing farm products and those servicing farming and building construction and transport. The chief industries expanded were freezing works and dairy factories, the production of farm and dairy machinery, lime and cement works, gas and electricity, ship and boat building, and tinware and sheet metal works.

The first two decades of the century taken as a whole were years of expanding production and generally rising prices. There were, of course, ups and downs in economic prosperity. A break occurred in overseas prices in 1908, but recovery was rapid. The value of exports rose from £13,055,249 in 1900 to £45,592,294 in 1920. If prices had remained unchanged at 1900 levels, exports would have reached only £20,000,000, and therefore £25.5 million of the £35.5 million increase in exports was due to rising prices, which were particularly marked during the First World War.

This increase in the volume and value of exports had important repercussions on the Dominion's economic status. It precipitated great inflation in land values, which had serious effects in the post-war period of falling prices. There was also a great increase in savings, with interest rates falling. The combined commercial and savings banks deposits rose from £22.2 millions to £106.6 millions, and an increasing percentage of public and private capital development was being financed internally out of the savings of the people.

By 1914 the frontiers of pastoral farming had been pushed to the limit of the easily-developable lands of the Dominion. The vigorous land settlement policies of the Ballance, Seddon, and Ward Ministries had advanced settlement to cover practically all the developable bush land, and the settlement of returned soldiers after 1918 had resulted in the subdivision of many large estates and stimulated the development of dairying.

Possibly in no period in New Zealand's history did farmers and their families responsible for the advancement of farming endure such hardness as did the men, women, and children in the pioneer settlement of the great forests of the central western area of the North Island and on dairy farms in all parts of the country. Mud was their enemy. The unpaved roads and tracks winding through the wilderness of bush and mountain were usually impassable from autumn to late spring, and isolation was often a mental as well as a physical hardship. On dairy farms milking in unpaved yards and primitive sheds was a great burden on women and children until concrete floors and milking machines were introduced to improve conditions and lighten their labours.

Probably also at no time was so little attention paid to the provision of even moderate comfort in homes erected on new farms. The earlier settlers had erected substantial homes or neat cottages, but at this period even the Government's advice to settlers was to economise on housing until the new farm was fully developed. As "The Settler's Handbook of New Zealand" (1908) so aptly states, "No doubt when the settler has won his battle with the wilderness, got his holding in order, and is drawing a comfortable income from it, he will build himself a handsome house, provide himself with a good steading, and arrange his place after the pattern of prosperous prospectors. But as he goes along the average settler does not think of £250 for a house or even £100. Neither the highest nor the lowest estimates under this head concern him. Many a man lives in a tent and brings his family to it. Many more put up 'whares' costing perhaps not less than £20 and certainly not more than £40. . . . Fencing represents an expenditure which must be incurred. . . ." In short the period was essentially one of bad farm houses and good fences. As the second pioneer age lowered the remaining wilderness of bush, that truly New Zealand masterpiece, the seven-wire sheep- and cattle-proof fence, reached its zenith of craftsmanship.

Though the period ended with problems of inflated land values, falling prices, and reversion and deterioration on much of the recently-developed bush land, it was a very important period in New Zealand's history. Wealth, incomes, and population had grown rapidly; electricity and motor transport were coming on the scene to lighten physical work; and the foundations of the practices of intensive grassland farming had been laid, so that during the next 25 years the country's exportable surplus was to continue to increase, although no major expansion was made in the area of land farmed.

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SHOW DATES

THE following are dates and venues of A. and P. shows in October, November, December, and January.

October 17 and 18—Poverty Bay A. and P. at Gisborne.

October 18—Ellesmere A. and P. at Leeston.

October 22 and 23—Timaru A. and P. at Timaru.

October 22 and 23—Hawke's Bay A. and P. at Hastings.

October 24 and 25—Marlborough A. and P. at Blenheim.

October 25—Northern A. and P. at Rangiora.

October 30, 31, and November 1—Waikato A. and P. at Hamilton.

October 31 and November 1—Wairarapa & East Coast P. and A. at Carterton.

November 6—Ashburton A. and P. at Ashburton.

November 7—Amberley A. and P. at Amberley.

November 7 and 8—Manawatu and West Coast A. and P. at Palmerston North.

November 13 and 14—Canterbury A. and P. at Christchurch.

November 14 and 15—Wanganui A. and P. at Wanganui.

November 15—Kaikohe A. P. and H. at Kaikohe.

November 15—Taieri Agricultural Society at Outram.

November 18 and 19—Thames Valley A. P. and H. at Te Aroha.

November 18 and 19—North Otago A. and P. at Oamaru.

November 21 and 22—Nelson A. and P. at Richmond.

November 21 and 22—Egmont A. and P. at Hawera.

November 22—Bay of Islands P. and I. at Waimate North.

November 22—Kelso A. and P. at Kelso.

November 22—Courtenay A. and P. at Kirwee.

November 25 and 26—Otago A. and P. at Dunedin.

November 28—Clutha and Matau A. and P. at Balclutha.

November 28 and 29—Stratford A. and P. at Stratford.

November 29—Tokomairiro A. and P. at Milton.

November 29—Winton A. and P. at Winton.

December 2 and 3—Gore A. and P. at Gore.

December 6—Wyndham A. and P. at Wyndham.

December 9 and 10—Southland A. and P. at Invercargill.

December 13—Otago Peninsula A. and P. at Portobello.

January 9 and 10—Wairoa County A. and P. at Wairoa.

January 10—Blueskin A. and P. at Waitati.

January 17—Waiau A. and P. at Tuatapere.

January 17—Waikouaiti A. and P. at Waikouaiti.

January 23 and 24—Taumarunui and District A. and P. at Taumarunui.

January 24—Marton District A. and P. at Marton.

January 26—Helensville A. and P. at Helensville.

January 29—Tauranga A. and P. at Tauranga.

January 30 and 31—Horowhenua A. and P. at Levin.

Tree Tomatoes in Growing Demand

By **R. G. HAMILTON**, *Horticultural Superintendent, Auckland.*

AN increasingly-popular fruit in New Zealand is the tree tomato *(Cyphomandra betacea* Sendt). This sub-tropical shrub of the *Solanaceae* family is a native of South America, where it is found in Brazil and Peru. Ripening in New Zealand from late April to early November, the tree tomato has a very long fruiting season. Its wide range of culinary uses makes it a valuable winter and spring fruit, and as it matures when little other fresh fruit is available, it provides a welcome addition to the menu. Elsewhere in this issue is a section of approved recipes for the many ways in which the fruit may be used.

ALTHOUGH introduced into New Zealand many years ago, it is only of recent years that the fruit has become better known for its many uses. It is now much sought after, and its popularity is indicated by the high prices realised for the fruit on local markets. As with a number of other fruits, the tree tomato calls for an acquired taste and many people on first trying it find the flavour rather harsh. However, further trial generally wins approval.

Because of the increased demand for this fruit in recent years, there has been a rapid expansion in the area under commercial cultivation, and there is still an unsatisfied demand for land suitable for its culture. Being a sub-tropical shrub and considerably more frost tender than the lemon, its commercial culture has been confined largely to the frost-free areas of the Auckland Province.

It is estimated that there are 136 acres of tree tomatoes at present under cultivation. The greater part of this area comprises numerous small plantings of up to an acre in extent. The number of larger plantings, however, is increasing since the fruit waxed in popularity. The cultivation of the tree tomato is in the main carried out as a small adjunct to citrus culture or other similar types of culture on small holdings.

Tree tomatoes are easy to grow under suitable climatic and soil conditions and begin bearing within 18 months from planting out. Their ease of establishment from seed or cuttings and early productivity make them an attractive proposition. Under suitable conditions the plant will produce from 40 to 60lb. of fruit annually. An average crop under normal conditions would be about 400 bushels an acre. While it is somewhat difficult to assess its period of economic life, it is probably about 10 to 12 years.

Selection of Site

With many fruits proximity to markets is an important consideration in selecting a site for growing them commercially, but the tree tomato, being firm fleshed and

[Sparrow Industrial Pictures Ltd. photo.

A well-laden tree tomato branch.

having a tough skin, may be transported long distances without detriment. Therefore, in its case, although proximity to market is not to be ignored, it is a point of far less importance than suitability of climate and soil when selecting a site.

It is at present essential for successful establishment and production that commercial plantings be made in frost-free areas or in those experiencing only very light frosts. It is possible, however, that frost-protection methods may permit the economic establishment of tree tomatoes in areas where frosts are slightly greater than can be withstood by an unprotected plant.

Because of climatic and soil limitations, there are few localities in New Zealand ideally suited to commercial production of this fruit. At present it is grown commercially in the North Auckland district (principally at Kerikeri); in Auckland and adjacent districts such as Massey, Waitakere Hills, Bombay, and Clevedon; in favourable areas from Thames up the Coromandel Peninsula; at Tauranga and Te Puke, and to a limited extent in comparatively frost-free areas near New Plymouth.

Further suitable areas for the extension of the industry include parts of the eastern coastal belt north of Auckland, some areas along the Coromandel Peninsula and parts of the coastal belt from Kati Kati to Te Puke, and also between Opotiki and Te Kaha. Possibly some of the largest suitable areas lie between No. 1 and No. 3 roads behind Te Puke; not all of this area is frost free, but fairly-extensive blocks are comparatively so and established plantations are doing very well.

Although tree tomatoes are not yet established commercially in the Gisborne district, some suitable areas exist around Ormond, Hexton, Manutuke, and Ruatoria. It is possible that small areas in the Heslington Belt, Nelson, may prove suitable for the commercial production of tree tomatoes.

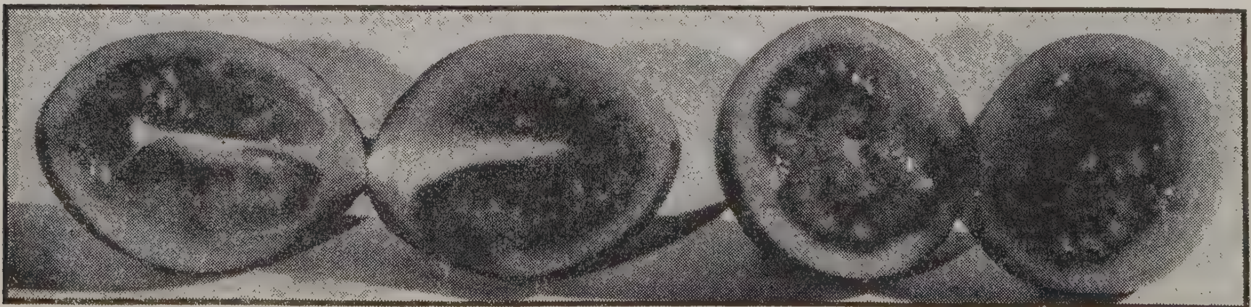
Light, fertile, well-drained soils are best for successful establishment. The plants are intolerant of excess soil moisture and soon decline under waterlogged conditions; on the other hand they react unfavourably to drought, and ample summer moisture is necessary. In some districts irrigation during dry periods would be an advantage.

Shelter Necessary

With its large leaves and very brittle wood the plant is easily damaged by wind. When heavily laden with fruit the branches will break very easily and even very little wind may cause a major break. Adequate protection from wind is therefore necessary for each plantation, and shelter belts should be established where natural protection is at all inadequate. Long, narrow plantations are more easily protected than square ones, and in most districts it is unwise to have blocks greater than half an acre without some subdividing shelter.

Being shallow rooting, the plants are easily blown over, and on many sites lacking in shelter it has been customary to provide support with a stout stake for each plant or supporting wires running the length of each row. Both methods, however, are costly and much less satisfactory than the provision of adequate shelter.

Shelter should be established before setting out the plantation, as the young plants may be severely retarded if exposed to wind. Shelter can be secured rapidly by growing *Albizzia lopantha.* Although regarded more as temporary shelter, it will, if kept trimmed, prove satisfactory as subdividing shelter for the life of the tree tomato plantation. Lopantha seed may be sown during October in the required position and should be from 10 to 12ft. high within two years.



[Sparrow Industrial Pictures Ltd. photo.

Tree tomato fruits cut lengthwise and crosswise.

Hakea saligna is a popular shelter in the North Auckland district. A rapid grower, it lasts for many years. When used as subdivisional shelter it should be kept well trimmed, otherwise its width will become excessive.

Main Varieties

The two main varieties of tree tomato are the yellow, which is the oldest in cultivation, and the red. There are also many hybrids.

The yellow variety has a yellowish-orange skin with yellow flesh and seeds and its fruit ripens later than that of the red—principally from June on. Of recent introduction, the dark red (commonly called black) has a dark purplish skin when nearing maturity and turns a lighter shade on ripening. The flesh is light orange and the seeds are black.

The red variety is more popular on the market and is planted in greater proportion. Possibly its popularity is due to its bright colour, for the yellow is more palatable and without the somewhat harsh flavour associated with the red. The yellow is to be preferred for preserving or as a stewed fruit and requires less sugar. Both kinds are recommended for commercial planting, with a preference for the red because of its popularity on the market.

Propagation

The tree tomato is easily propagated from seed or cuttings. Plants from seed generally develop with a straight main stem of up to 5 or 6ft. before branching. Cuttings produce low, bushy plants with branches down to ground level. Both types have advantages.

Seedling plants are generally preferred for commercial planting, because their upright growth facilitates cultivation and harvesting. Their height makes them more susceptible to wind damage and for this reason some growers prefer plants raised from cuttings for positions which are difficult to shelter.

The home gardener should select a type to suit his particular conditions, using cuttings for rather exposed positions and seedlings if the shelter is adequate or if it is desired to cultivate close to the plant. Both the red and yellow varieties are recommended for the home garden.

Fruit for seed should be selected from disease-free trees of good productivity and bearing a desirable type of fruit. Seedlings may show considerable variation from the parent tree unless care has been taken to prevent cross pollination. If this has not been possible, the following guide is recommended:

Yellow fruits with yellowish flesh and light-coloured seeds are likely to come fairly true to type.

If the seeds are darkish or black, variation is likely to occur.

Little variation should occur with dark-red fruits if the flesh is orange and the seeds black.

Extracting Seed

After harvesting the mature fruit about July or August the seed should be extracted by either of the following methods, the first being recommended when quantities of seed are being saved for commercial purposes:—

1. Squeeze the pulp into a wooden container and add 20 c.c. of commercial hydrochloric acid for each 5lb. of pulp. After 30 minutes the seeds should separate freely from the pulp and may then be washed in a fine sieve under running water and finally dried.
2. Squeeze the pulp into a container and cover with water. Allow the pulp to ferment for 3 to 4 days and then wash in a fine sieve and dry.

Sowing under glass is recommended where early spring conditions are cold and wet or when it is desired to raise large plants for May planting. The seed may be sown very thinly ¼in. deep in trays during early September, and the young plants pricked out into nursery rows during late October or early November, or they may be pricked out into other trays during October and into nursery rows during early December.

Under suitable conditions seed may be sown outdoors during September in the warmer districts north of Auckland, but for other districts October is recommended. Seed-beds should be carefully prepared in sunny, well-sheltered positions, using a friable soil containing a good proportion of humus. After a fine tilth is obtained seed is sown thinly from ½ to ¾in. deep in rows 6 to 12in. apart. The young seedlings usually appear in from 3 to 4 weeks and may be pricked out into nursery rows in December.

Nursery Beds

Nursery beds established in warm, sheltered positions will enable young plants to make rapid growth. Where it is necessary to overwinter plants in nursery beds a well-protected position will be required, for the young plants will be severely damaged if exposed even to light frosts. Four to 5oz. per square yard of blood and bone and superphosphate given to the beds before setting out the plants will assist rapid establishment.

It is advisable to allow ample room for seedling plants to develop; 12in. between plants and 24in. between rows is not excessive. Weak, spindly plants may result from overcrowding in nursery beds. Closer planting is permissible in colder districts where frost-free areas suitable for nursery beds are limited.

[Sparrow Industrial Pictures Ltd. photo.

The earth should be well firmed around the plant to prevent it from becoming loose in wet weather.

Cuttings may be selected in autumn or early spring and planted in prepared nursery beds with the same spacing between plants and rows as for seedlings. Straight 1- to 2-year-old wood between ½ and 1in. in diameter and from 18 to 30in. long makes excellent cuttings which will root readily when set from 6 to 12in. apart in firm soil. All leaves should be removed and the shoot cut square at the base immediately below a node.

Establishing Plantation

From April to May is a suitable time for planting in frost-free areas and enables the plants to become established before the winter. In other than totally frost-free areas spring planting is desirable.

Many plantations have been set out with insufficient room between plants for normal development, resulting in overcrowding which has made harvesting difficult and satisfactory disease control almost impossible. The present practice with many growers is to plant on the square system with 10ft. between plants each way, but even at this spacing there is eventually in-

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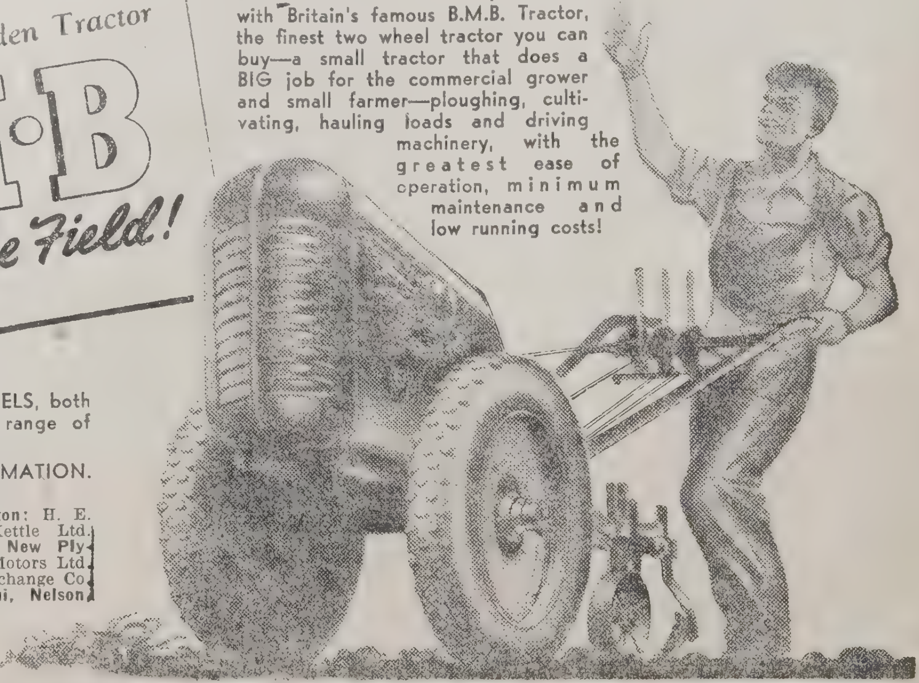

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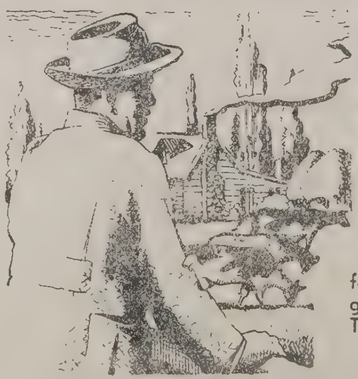

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sufficient room between the rows for cultivating equipment or a portable spray outfit.

With its space between each pair of rows, the double-row system of planting has advantages, among which are:—

1. There is sufficient room to operate a portable spray outfit and also for cultivating equipment.
2. Cultivation is required only between each pair of rows; the land in the double row is mulched.
3. Harvesting is facilitated.

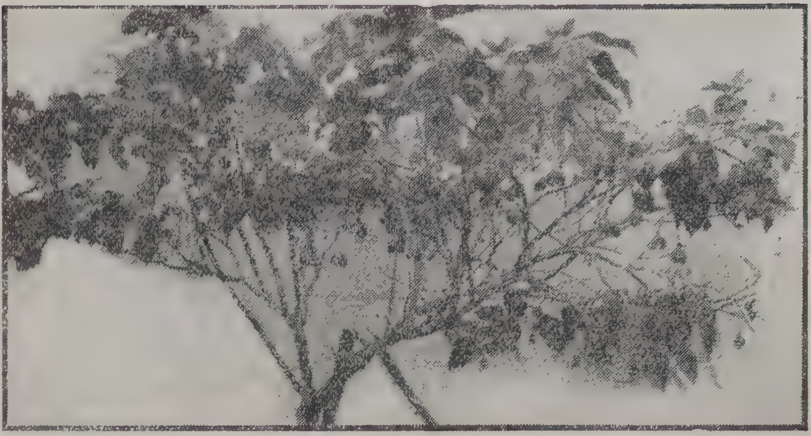
Tree tomatoes are set out 8 to 10ft. apart in rows which are planted in pairs 8ft. apart with 14ft. between each pair. Planting is on the diagonal, not the square system, as is shown in the following plan.—

```
1st pair     }  X   X   X   X   X   X   X   X
(8ft. apart) }    X   X   X   X   X   X   X
                     Space 14ft. wide.
2nd pair     }  X   X   X   X   X   X   X   X
(8ft. apart) }    X   X   X   X   X   X   X
```

This spacing is sufficient for normal conditions of growth, but on very rich soil it may be advisable to allow 9ft. between the rows in each pair and 16ft. between double rows.

When the trees reach maximum size they intermingle in the double rows, thus giving some support and protection to one another.

Adequate preparation of the soil is advisable, and the working of a green crop such as blue lupins into the soil some time before planting will be of benefit, as also will be an initial deep ploughing.



A young tree tomato plant grown from a cutting, showing its low, bushy habit.

When setting out the young trees, 1lb. of blood and bone may be lightly forked into each hole and the earth well firmed around each plant to prevent it becoming loose in wet weather.

General Maintenance

Tree tomatoes are shallow-rooting plants and may be severely damaged by close, deep cultivation, but if they are grown in light, friable soil, deep cultivation will be unnecessary. Frequent shallow cultivations in spring and summer to control weed growth and preserve available moisture are all that are necessary. In single-row plantations cultivation must be between each row, but in double-row plantations cultivation need only be carried out between pairs of rows. The ground in the double row may be mulched with grass, old hay, or a green crop grown and cut for the purpose.

Green crops for incorporating in the soil to enrich its organic content should be part of the regular programme. Sown in late January, the crop should be ready for turning in during early May. The use of discs or the rotary hoe for this purpose is preferable to ploughing.

As the fruit is borne on wood of the current season, it is necessary to keep trees in vigorous condition. Therefore regular applications of fertiliser are desirable, early spring being a suitable period for them. The quantity to apply will vary with the fertility of the soil, but from 3lb. to 5lb. of blood and bone a plant will be adequate for most conditions.

A double-row system of planting at Kerikeri, with 8ft each way between plants and 12ft between pairs of rows. Wire supports for the trees are carried on heavy cross-poles.

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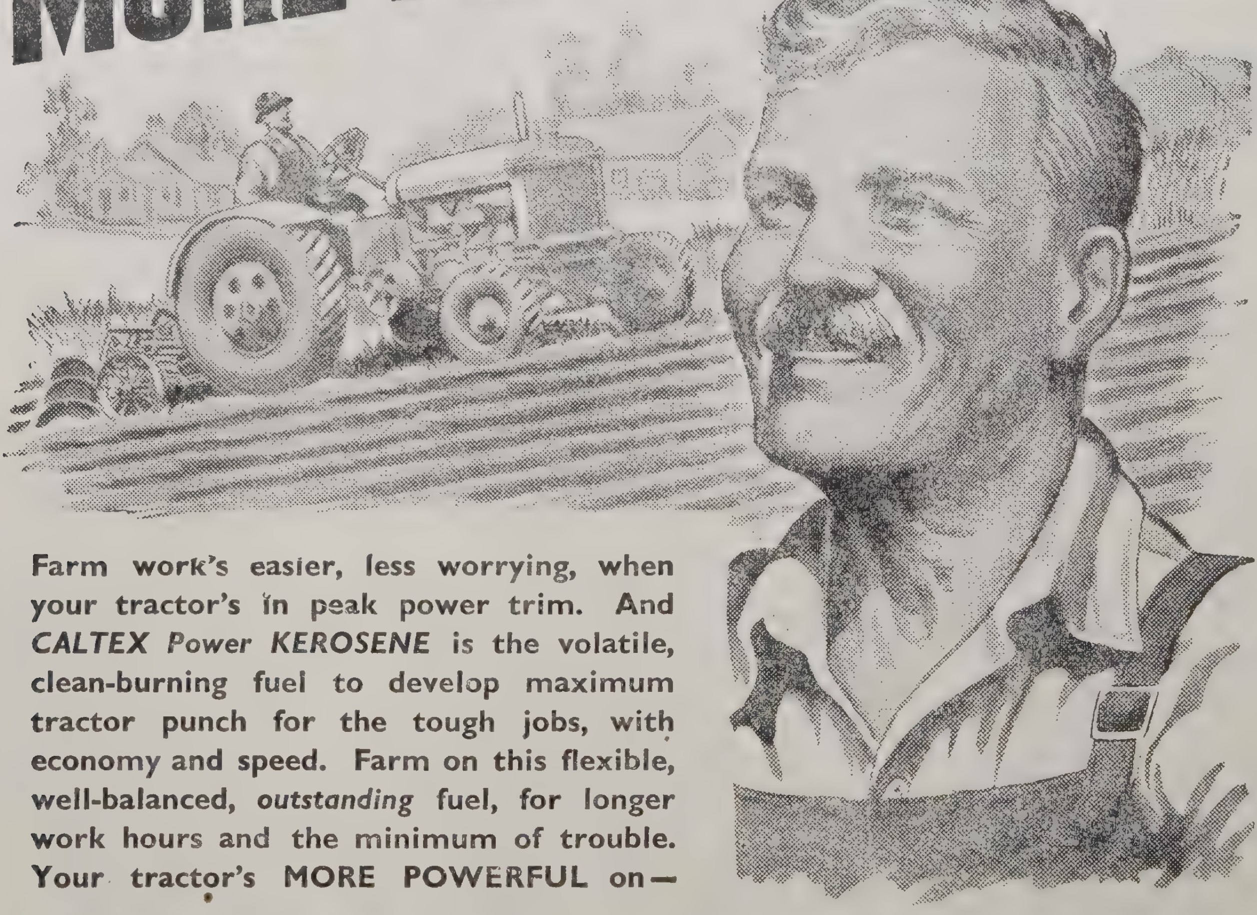

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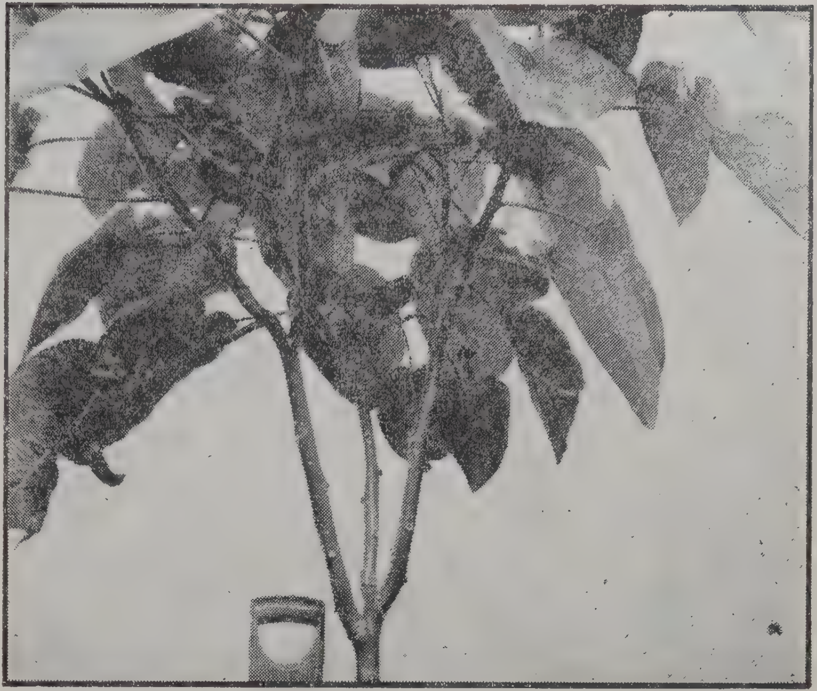
The possible need for supplementary irrigation during the hot summer months should not be overlooked, and if past experience confirms it, early preparation should be made.



[Sparrow Industrial Pictures Ltd. photo.

A seedling plant which was pinched back in December to 3ft. high to encourage the formation of branches. The three resultant branches were pinched back after making 18in. of growth to cause further branching.

Pruning

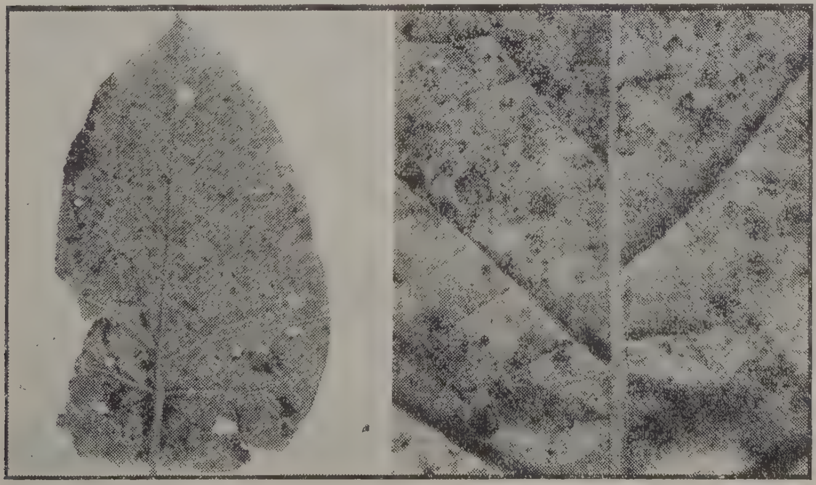
During the first 12 months after planting, the young seedling tree may need training. If it is making strong growth it will generally be advisable to stop it at a height of 3 to 4ft. to encourage branching at this level, otherwise a height of 5 or 6ft. may be reached before the plant branches, resulting in undue exposure of the tree to wind, and also causing the fruit to be carried at a height inconvenient for harvesting. Plants grown from cuttings are usually well furnished with low branches and so do not require "stopping," but it may be advisable to remove some of the lowest branches to secure sufficient clearance from the ground.

The aim in pruning the bearing tree is to secure adequate strong new growth each spring. If left unpruned, the new fruiting wood gradually extends from the ends of branches and laterals and leaves the centre more or less barren. Limbs frequently break because of the weight of the fruit on the ends of branches and laterals.

By judicious pruning a sturdy framework may be built and the fruit carried well in toward the centre of the tree and on limbs sufficiently strong to carry the weight of the crop.

Laterals which have fruited should be cut back to encourage new growth. Branches should be thinned to prevent overcrowding and shortened when necessary to promote new growth toward their bases. A well-balanced framework with the branches radiating fairly evenly from the centre of the tree is most desirable, and any criss-cross branches and laterals should be removed. Dead wood should also be cut back to healthy tissue.

The period at which pruning is carried out greatly influences the time of maturity of the following crop. Early spring pruning induces early maturity, while pruning delayed until October or November results in a late crop. Thus the harvest can be spread from late April to November by commencing pruning in early spring and continuing to November, a different part of the plantation being pruned each month. The trees pruned early will complete their fruiting early and may be pruned again during early spring the following year.



Left—*Oidium* stage of powdery mildew on a tree tomato leaf. Right—A sector of an affected leaf.

Diseases

Fortunately there are few diseases at present which cause the tree tomato grower any great concern.

Powdery mildew (*Oidium* sp.) is the most common tree tomato disease. It causes greyish-white powdery patches on the under-sides of the leaves and greyish markings on leaf stems; if unchecked it may lead to widespread infection and severe defoliation, especially among older leaves.

Control of the disease is not difficult and may be effected by applications of lime sulphur 1 part to 160 parts of water plus colloidal sulphur (40 per cent.) at 2lb. per 100 gallons. If the colloidal sulphur is omitted, the dilution of lime sulphur should be 1 part to 120 parts of water. Applications should be started early enough in the spring to catch the first infection and should be continued at intervals of 3 to 4 weeks until control is secured.

For 4 gallons of spray add 4 fluid ounces of lime sulphur and 1¼oz. of

[Sparrow Industrial Pictures Ltd. photo.

Sorting and packing tree tomatoes for the market.

colloidal sulphur or ¼ pint of lime sulphur if used alone.

Sclerotinia disease (*Sclerotinia schlerotiorum*) has a wide host range, but although it has been observed on tree tomatoes, fortunately it has not proved troublesome under normal conditions. Infection causes light-brown lesions on the stems of the plants, followed by small, hard, black fruiting bodies which may form either outside or inside the stems and by which the disease may readily be identified. The lesions may gradually encircle the stem and by cutting off the food supply cause wilting of that portion of the plant above the point of infection. The disease is not likely to prove troublesome if the plants are well spaced and rank weed growth is suppressed.

Ascochyta disease (*Ascochyta* sp.) is at present a disease of only minor significance. Infection causes small, black, circular, dead areas on leaves, mainly the older leaves. This disease is more likely to attack plants which have become weakened by severe climatic conditions. Should the disease appear to an extent requiring control measures, apply Bordeaux 3:4:50.

Insect Pests

A looper caterpillar may cause leaf injury by eating large, irregular-shaped holes in the leaves. It may be serious in the nursery beds, but seldom causes much trouble on trees which have been planted out. Control measures consist of applications of lead arsenate at 2lb. per 100 gallons at intervals of 3 to 4 weeks during midsummer.

Green aphis sometimes attacks the plants, but is easily controlled by applications of nicotine sulphate 1 part to 800 parts of water, plus soft soap 2lb. per 100 gallons.

Tree tomato mosaic is a virus disease causing a light-coloured mottling of varying intensity on leaves and at times also on fruit. Although infection appears fairly general in some districts, it is not yet possible to assess its economic significance. Although little distinction is made between unaffected fruit and fruit showing mosaic mottling, it is possible that as supplies increase and the buyer has a wider choice, affected fruit may be at a discount. By keeping the plant in a vigorous condition any ill effect of the disease may possibly be offset.

A further condition caused by virus is a severe narrowing and distortion of the leaf. So severe may be the distortion on some leaves that little other than the mid-rib may grow and a leaf somewhat resembles a bootlace, which has led to the term "bootlace virus" being applied to this condition.

The severe leaf distortion must considerably restrict the elaboration of plant food by the leaf and result in little or no growth being made by affected plants. The disease is particularly serious on young plants.

Spraying has no effect on virus, and where it is necessary to control this disease removal of the infected plant is the only satisfactory method. At present there appears no need to take this step with plants affected by tree tomato mosaic, but it is strongly recommended that plants affected by bootlace virus should be carefully pulled out and destroyed to prevent further spread of the disease.

Die-back: A die-back condition has appeared on many plants with varying intensity in different districts. It may cause the death of the flower or fruit cluster and also cause a die-back of twigs and shoots. No causal agent has yet been found to account for the condition, but investigations are continuing.

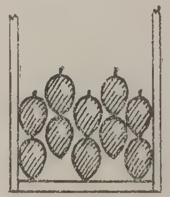
Harvesting and Packing

Harvesting usually starts toward the end of April and may continue until November. Not all the fruit of a tree ripens at the same time and therefore numerous pickings are necessary as fruit reaches maturity. Preferably fruit should be cut from the plant, not pulled, leaving about half an inch of stem adhering. Lemon harvesting clippers may be used for this purpose. Picking bags of the type used for harvesting apples are suitable for harvesting tree tomatoes and are much more convenient than picking into boxes.

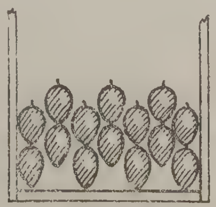
Little grading is necessary other than to discard fruits showing splits or other damage, but it is advisable to sort the fruit into three or four sizes to facilitate packing. The case most favoured for packing is No. 8 (size 4½in x 12in. x 16in.). Packed on the diagonal pocket-pack system, the fruit presents an attractive appearance when the case is opened. Other cases used are No. 6 (size 7in. x 7in. x 18in.) and to a limited extent No. 7 (size 6in. x 9in. x 11in.).

Fruit is packed in all three types of cases on the diagonal pocket-pack system as follows:—

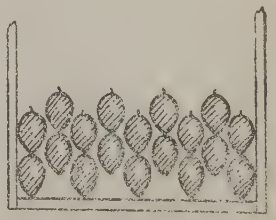
Case No. 6: The pack is termed a 3 x 2 pack, by which is meant that three fruits are placed across the end of the case—one in each corner and one in the centre—and the next row comprises two fruits placed close against and partly between the first three fruits. The third row again comprises three fruits and the fourth row two fruits and so on until the bottom



No.6 CASE
3X2 PACK



No.7 CASE
4X3 PACK



No.8 CASE
3X4 PACK

layer is completed. The second layer is commenced with two fruits placed in the pockets formed by the first three fruits below, and the second row comprises three fruits and so on. Five layers are required to fill the case.

Case No. 7: The pack is termed a 4 x 3 pack as four fruits are placed across the end of the case—one in each corner and two at even distances between—and the next row is three fruits, repeating four and then three fruits until the layer is completed. The second layer is commenced with three fruits, then four and so on. Four layers are necessary to fill the case.

Case No. 8: Two packs, 5 x 4 pack for the smaller fruit and 4 x 4 for the larger fruit, are necessary for this case. The 5 x 4 pack commences with five fruits across the end of the case, then four, and so on. Examples of the 3 x 2 pack, the 4 x 3 pack, and the 5 x 4 pack are shown on the opposite page, and the 5 x 4 and the 4 x 4 pack are also illustrated on this page.

For ease of packing, the nose of the fruit should be toward the end of the case at which the pack is commenced, or, in other words, facing the packer.

Fruit in a well-packed case will travel well, opening in an attractive condition, and creating a favourable impression with the prospective purchaser. Each case should be lined before packing, using plain white newsprint or green lining paper.

Each case should be neatly branded with the railing or shipping mark, the name of the fruit, and some indication of fruit size such as "large," "medium," or "small."

Recipes showing the wide range of culinary uses to which tree tomatoes can be put have been prepared by Eva Topping, Rural Sociologist, Auckland, and are to be found elsewhere in this issue.

Conclusion

The tree tomato may be easily grown under suitable conditions and its wide range of culinary uses is bound to increase its popularity.

For further detailed information of the tree tomato growers are advised to consult local orchard instructors of the Department of Agriculture.

Acknowledgments

Appreciation is expressed of assistance by officers of the Plant Diseases Division of the Department of Scientific and Industrial Research in the preparation of the sections on diseases and pests.

References

"Manual of Tropical and Sub-tropical Fruits" (1924), W. Popenoe, pp. 452-453; "The New Zealand Journal of Agriculture," February, 1943, pp. 93-94, F. Sydenham; "Journal of New Zealand Institute of Horticulture," 1929, Vol. 1, No. 31, pp. 61-62, W. H. Rice.

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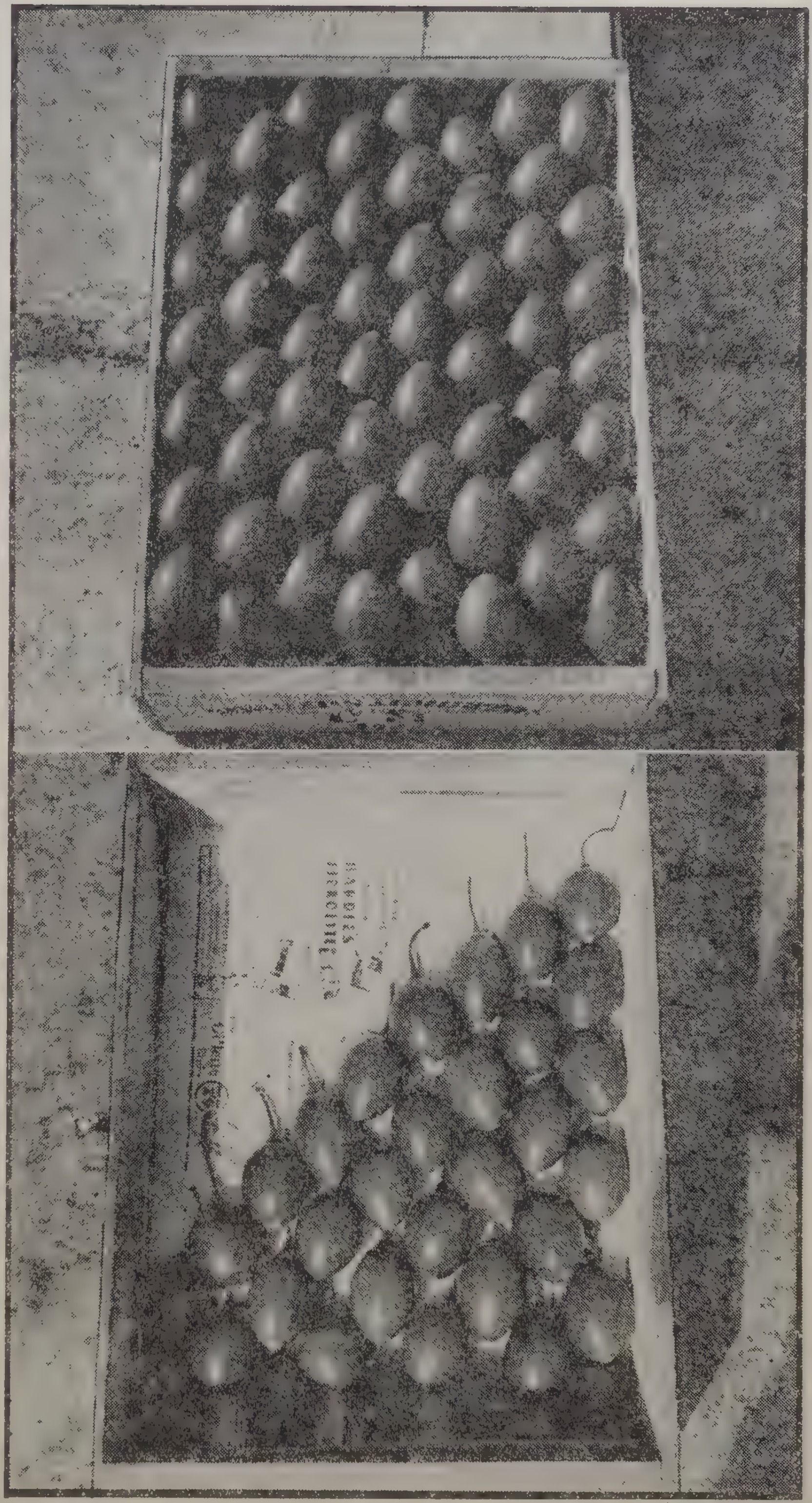
PACKING OF TREE TOMATOES



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Upper—A completed 4 x 4 pack. Lower—Part of the bottom layer of a 5 x 4 pack.

FARM WORK FOR OCTOBER

By the Fields Division.

OCTOBER is one of the busiest months for the farmer, particularly on mixed farms where an important part of the income is determined by the cropping work which can be successfully carried out in this month. Many of the important cash crops are sown in October.

CEREALS

It is now generally too late for wheat sowings, but barley and oats may be sown on suitable land, though sowings should not be delayed unduly. Preparation of seed-beds for spring-sown cereals should result in a less cloddy surface tilth than for autumn-sown cereals, but too fine a surface is liable to cake if heavy rains occur after sowing. Preparatory cultivation should aim at giving a thorough under-tilth. Clover and grass seed may be sown with spring cereals under suitable conditions. In warmer districts on fertile land maize is a high-producing crop which may be sown as soon as danger of frosts is past.

PEAS

All varieties of peas may be sown during October. Free-working, fertile, medium to heavy loams appear to be most suited to this crop. It is not considered sound farming practice to sow peas on soils liable to heavy weed infestation.

LUPINS

Lupins for seed should not be sown too late. Autumn sowing is generally preferred for seed production, but crops sown in October may give successful results on suitable land in good seasons, provided the crop is not frosted.

LINSEED

On clay loams linseed is generally sown in October or early November. On lighter land September sowings may be possible, but generally, if the usual spring rains are experienced, it is not possible to work clay soils down to a suitable tilth before October. Linseed is best sown as soon as warm conditions experienced in the spring are likely to persist. It is a crop which matures in a comparatively short period, it germinates quickly, and it does best if it receives no check from time of sowing.

POTATOES

In the South Island main crop potatoes are planted in most districts during October. Thorough cultivation for this crop is well repaid. The use of Certified seed of a variety suitable for the land and district is important. Adequate manuring is another most important factor in the success of the crop. In districts where weeds are a problem tall-growing, bushy varieties of potatoes such as Dakota and Aucklander Tall Top may be preferred.

SUPPLEMENTARY FEED CROPS

Work in connection with supplementary feed crops is discussed in an article elsewhere in this issue.

LUCERNE

Sowings of lucerne may be made in warmer districts from October onwards, but it is unwise to sow lucerne on weed-infested land at this time: January sowings are preferable for such areas following a thorough summer fallow aimed at germinating and killing weeds. At least a ton of lime before sowing is desirable on most areas except those which are known to have a high lime content. Lucerne is a lime-loving plant and on soils with a high lime content it usually does well.

In late districts it may be possible to give a phosphate dressing to established stands. In earlier areas the crop will be ready for cutting, probably as silage, some time in the month.

PASTURES

Sowing Down: Spring sowing of pastures may be made on areas where weeds do not present a great problem, or on mixed cropping land where clover and grass may be sown on autumn or spring cereals. Undersowing of cereals has proved quite a satisfactory method in some districts for the establishment of red clover or of white clover sown alone or in conjunction with one of the ryegrasses. Similarly grass is frequently successfully established by sowing it in conjunction with rape or turnips. Undersowing of linseed has also been known to be successful in some districts. However, in most districts the best results in the establishment of pasture have been achieved by sowing grass and clover alone on a well-prepared seedbed after a summer fallow. It should be remembered that subterranean clover is best established by sowing in the autumn and not in the spring.

Shutting Up Areas for Seed: Consideration of the provision for stock feed will to some extent determine the area which may be shut up for seed at this time. Practices and times of shutting up vary in different districts, but generally areas to be saved for perennial, Italian, or short-rotation ryegrass are shut up about October. White clover pastures may be shut in October or November, or later in some districts, and cowgrass and Montgomery red clover areas are closed at times varying from October to December. Before shutting up any area for seed it is desirable to have an even growth throughout the paddock; if it has not been possible to do this by the grazing management of stock, the use of the mower is recommended. It is not too late to give a dressing of sulphate of ammonia to pastures being shut up for seed.

GENERAL

Farm Timber and Shelter: For farmers who wish to raise their own nursery stock for planting out trees for farm timber and shelter, September in the North Island and October in the South Island are most suitable for the sowing of coniferous and other small seeds.

Shearing Preparations: Shearing of dry sheep is under way in many districts during October. It will pay to have everything in readiness in the shed well before shearing starts. Avoidable hold-ups are annoying to all concerned in times when shearing labour is scarce. The shed itself should be cleared of all oddments such as hay and chaff for which it may have been used as a winter storage depot. The engine, if not electric, should be overhauled and all the shafting plant lubricated and adjusted. The handpieces, if not in order, should be attended to at once. A supply of combs, cutters, and emery paper should be on hand. Farmers interested may obtain free of charge from offices of the Department of Agriculture Bulletin No. 234 on the care and repair of shearing machines and Bulletin 261 on the sharpening of blade shears.

Water Supply: Farmers who are dependent on rain water for their dipping supplies should see that spouting and tanks are all in good order so that should a dry spell eventuate they will not be held up for their dipping requirements. The dip and yards should also be cleaned out so that there will be no waste of water at dipping time.

Production and Management of the Rape Crop

By J. P. BEGGS, *Instructor in Agriculture, Rangiora.*

RAPE *(Brassica napus)* was first grown in New Zealand in the 1860's, since when it has increased in popularity and for many years has been regarded as the country's best fattening crop for lambs and store sheep. In some districts the ravages of club root and insect pests have caused a departure from the growing of this crop; in others the improvement of pastures, brought about largely by the wider use of good strains of grasses and clovers and the increased application of lime and fertilisers, has led to less rape being required, more lambs being sold fat off the mothers. The earlier season and more favourable conditions of the North Island especially have allowed of great advance along those lines, but where lambs remain to be fattened after weaning the rape crop, when successful, is unsurpassed for the purpose.

RAPE is unrivalled as New Zealand's most important green fodder crop; greenfeed oats, which come next in order of areas sown annually, do not occupy half the area of rape, and the kales, including chou moellier, occupy an area slightly less than greenfeed oats. In the 1941-42 season 163,851 acres of rape was sown in the Dominion, but that acreage has fallen steadily since then to 155,225 acres in 1945-46. In addition, between 35,000 and 40,000 acres is sown annually in a mixture of rape and turnips. During the same period the total area of kales grown increased from 63,372 to 78,561 acres, while greenfeed oats fell from 68,394 to 38,660 acres.

Two of the 12 land districts, Canterbury and Otago, grow about three-quarters of the Dominion's total area of the crop. On an acreage basis the approximate distribution for the main districts is as follows:

	per cent.
Canterbury	54
Otago	19
Hawke's Bay	8
Southland	7
Wellington	5
Marlborough	3

Each of the other six land districts produces less than 1 per cent. of the total area.

The rape plant, with turnips, swedes, chou moellier, and cabbage, belongs to the brassica family in the cruciferae order of plants. It is a deep-rooting plant which produces foliage much resembling swede leaves, but, unlike the swede, it produces all its fodder value above ground level.

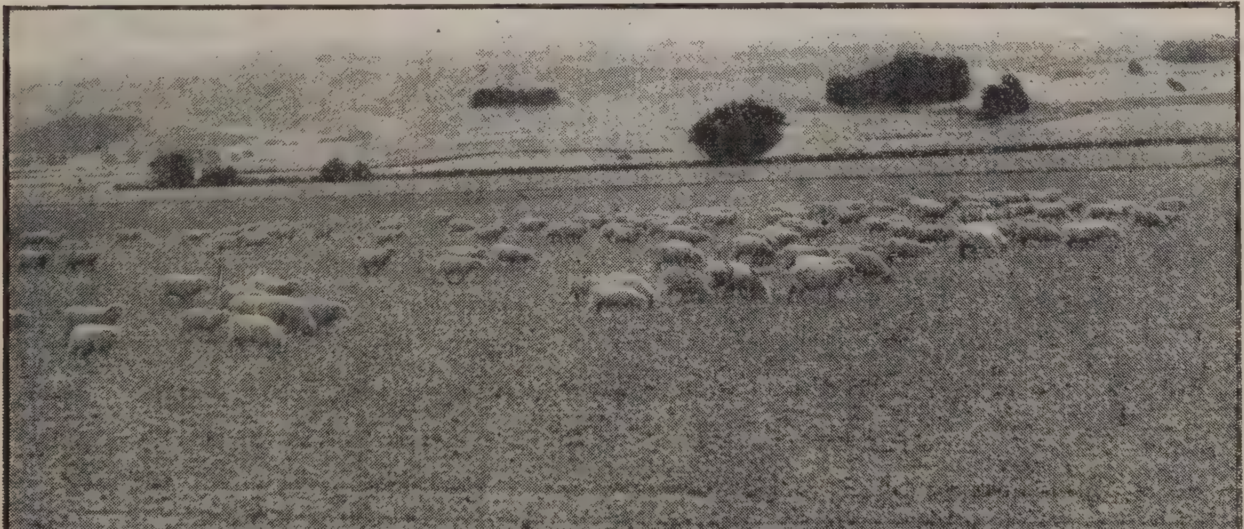
Mature rape is a very well-balanced fodder and is easily digested, but when immature it is not so well balanced in its nutritive ratio and more care is necessary in feeding if digestive disorders are to be avoided.

As well as being an ideal fattening crop, rape is of great value as a flushing crop for ewes before tupping. Though rape is a good milk-producing fodder, it is not widely grown for dairy cattle because its production to the acre is low and it tends to taint the milk. Pigs will thrive on rape if milk or meals are also fed.

Sufficient crops are also grown for the production of the country's seed requirements. That phase of production was fully dealt with in the May, 1946, issue of the "Journal of Agriculture."

Soil Type and Climate

Though rape will grow, and is grown satisfactorily, on a wide variety of soils, it grows best on rich, friable, well-drained loams. It builds up soil fertility through the manurial ingre-



[*Green and Hahn Ltd. photo.*

Rape is considered New Zealand's best fattening crop for lambs and store sheep.

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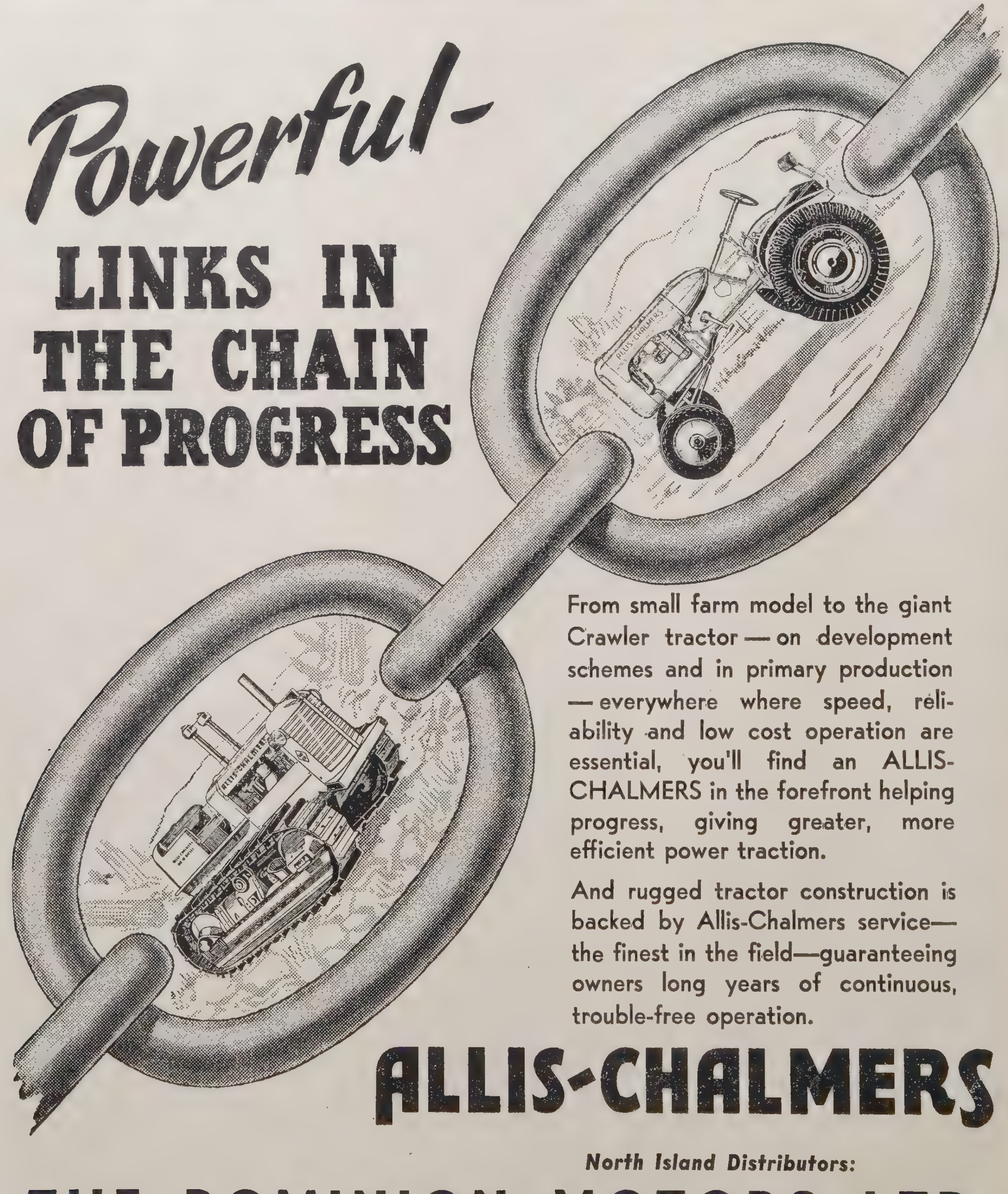

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dients and organic matter returned to the surface soil by the grazing animal. Clayey soils are not so suitable for rape growing, as grazing under wet conditions on such soils has a detrimental effect on the soil texture.

A wide range of climates is suitable for the growth of rape, but for the best results reasonably-moist conditions are desirable. Under such conditions growth is much more vigorous than when the crop is stinted for moisture, and its resistance to attack by aphis and other insects is greater. Under excessively moist conditions rape is not very successful, as it grows too rank and soft, and fails to mature properly.

Place in Rotation

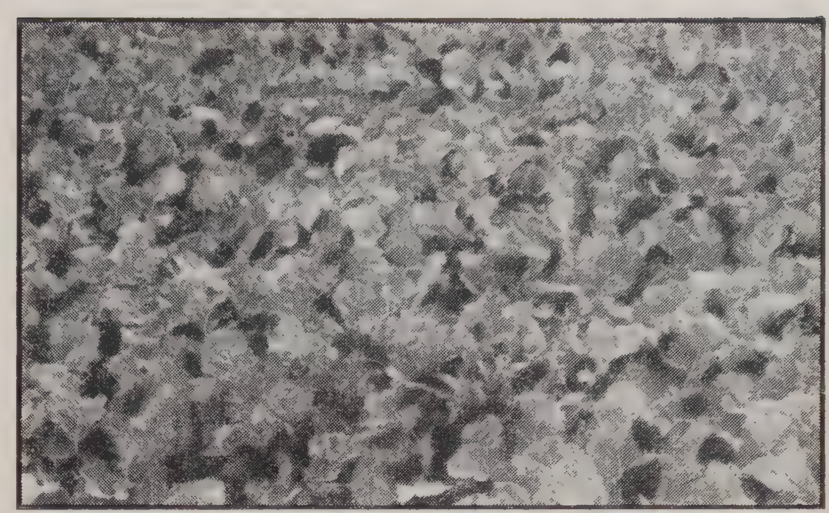
Rape is a convenient crop in that it may be grown satisfactorily almost anywhere in the rotation, though ideal results cannot be expected after all types of crops. It gives best results where the soil is well supplied with organic matter, and therefore it usually thrives after pasture. On land where club root is likely to occur sowing rape after such crops as turnips, swedes, or chou moellier is unwise, as all belong to the same plant family and are subject to the same disease. Though the crop preceding the rape may have shown only a slight infection, the disease can play havoc with the second successive brassica crop. Where the presence of club root is suspected and a brassica crop is desired, chou moellier is much safer than rape, as it has considerable resistance to the disease.

Rape is regarded as a good crop to precede a cereal, but it is often used at the other end of the rotation as a suitable crop to precede the sowing down of a pasture. In the North Island—in the Hawke's Bay and Wellington districts, for example—sowing pasture immediately after the feeding off of the rape crop is satisfactory. Feeding is usually completed by the end of February, and immediate surface working of the rape stubble allows of sowing during March. Though this practice is sometimes adopted in the South Island, it has been found risky because the crop is usually fed later, and because of cold conditions the later-sown pasture is slow to establish. When grass is sown after rape the land should be only surface worked and not ploughed in the preparation of the seed-bed.

Rape also has some value as a cleaning crop on weedy paddocks. As it is a rapid grower and provides a good cover of the ground, most weed plants are outgrown and smothered.

Strains of Rape

At present there are three main strains of rape in use: Giant, Broad Leaf Essex I, and Broad Leaf Essex II. All three come under the Department of Agriculture's certification scheme, and all are used commercially on farms.



The Giant strain of rape is a heavier producer at its first grazing than either type of Broad Leaf Essex, but does not recover for further grazings as the Broad Leaf Essex strains do.

The Giant strain is tall growing, with a pronounced stem. It produces a large bulk of fodder at the first grazing, but its power of recovery for the production of a second grazing is very poor.

Broad Leaf Essex I is dwarf in stature compared with Giant and does not produce a distinct stem. It is not a very heavy producer at the first grazing, but has good powers of recovery after grazing and is capable of producing good second and even some third growth.

The more recent selection, Broad Leaf Essex II, is the result of a cross between Giant and Broad Leaf Essex I. Its characteristics are very similar to those of the latter parent, but it grows larger and is a heavier producer. Its recovery after grazing is good.

The Giant strain is a heavier producer than either type of Broad Leaf Essex, but where second growth is wanted Giant should not be sown. Broad Leaf Essex II is perhaps a week later than the other two strains in reaching maturity, especially in southern districts. Experiments have shown that, in general, Broad Leaf Essex II, because of its greater production and palatability, can replace Broad Leaf Essex I with advantage, and in future all Certified Broad Leaf Essex rape seed produced will be of that type. In wet weather the Giant type has an advantage over Broad Leaf Essex in that it does not become so dirty. Some growers maintain, however, that the backs of the lambs are kept wetter in crops of Giant rape because of its greater height.

Another selection of rape which has been under trial for several years is a club root-resistant strain. It is a selection from Giant rape, and in growth form it is of the Giant rather than the Broad Leaf Essex type. In trials carried out by the Agronomy Division of the Department of Scientific and Industrial Research and the Fields Division of the Department of Agriculture this selection has given very promising results, and it appears likely that in the not distant future it will assume an important role in areas where club root is a serious disease. It matures slightly later than Broad Leaf Essex, but there is no apparent difference of palatability between the two types.

Preparatory Cultivation

The cultivation work required before rape is sown varies with the preceding crop, but the aim should be the same in all cases. Being a small seed, rape requires a well-worked, fine, firm seed-bed, and the method of producing such a bed will depend mainly on the weather and the initial state of the soil.

After grass best results are obtained by skim ploughing or grubbing in the late autumn or early winter, followed by deep ploughing in the winter. A period of exposure to frosts and weathering is then beneficial before the ground is worked down to a seed-bed in the spring. In that way an ideal moisture-retaining seed-bed will be produced. As with all crops, time allowed for natural agencies to assist in consolidating the seed-bed is well spent. The roller should be used before drilling to give an even and firm surface, but its use after drilling is not usually to be recommended, as a heavy shower of rain on a rolled surface results in the formation of a detrimental crust on top of the soil.

PRODUCTION OF RAPE

[*Green and Hahn Ltd. photo.*

Rape takes from 7 to 14 weeks to mature, according to climatic and other conditions, and sowing times must be adjusted so that maturity is reached when the lambs are ready for weaning.

Thorough cultivation and sound farming practice cannot be stressed too much, for under unfavourable conditions rape will not only grow slowly and weakly, but it will be a much easier prey for insect pests and diseases.

Time and Method of Sowing

The time of sowing depends on the time at which it is estimated the crop will be required for grazing. Under good conditions rape may be ready for feeding seven or even six weeks after sowing. In North Canterbury, for example, rape is sometimes sown about December 1 for the weaning of lambs in mid-January. Usually, however, a longer time is taken to reach maturity, and the period depends largely on district and weather conditions. In the southern and higher-rainfall districts rape usually requires up to 12 or 14 weeks to reach full maturity, and sowing times must be adjusted according to the date of weaning and the time the crop takes to reach maturity.

The crop may be seeded in rows or ridges up to 28in. apart, but the most common method is to sow through every coulter of the grain drill. In the North Island, where the grain drill is not such a common possession as in the South, rape is sometimes sown broadcast through the manure distributor. In such cases the seed is mixed with the fertiliser before drilling. The usual method, however, where a drill is available, is to sow in 7in. rows.

Whatever method is adopted, it is important that the seed is not buried too deeply. A well-worked and consolidated seed-bed will go a long way toward ensuring an even and not too deep drilling. Only light covering harrows should follow the drill, and the roller should not be used at this time.

The rate of seeding for a crop of rape in 7in. or 14in. rows is normally from 2½ to 3lb. an acre. With a view to counteracting the "scalding" effect of rape on sheep, it is a common and sound practice to add a small quantity of mustard, turnips, or both to the rape seed; a suitable seeding would be 4oz. of mustard and 2oz. of turnips an acre. If the saving of seed after the crop has been grazed is contemplated, however, it is disastrous to add the turnips and mustard.

Rape can also be sown in association with such crops as blue lupins, oats, or Italian ryegrass. In some districts a few pounds of linseed is sown with the crop.

Planning the sowing in breaks with about a fortnight between sowings is important. That is done to allow more profitable handling of the crop when it is being grazed.

Fertilisers

The chief fertiliser required is phosphate. Either superphosphate 44-46 per cent. or serpentine superphosphate is suitable, and some farmers, after experimenting with both these manures, have found that they get better results with the serpentine. Superphosphate has a detrimental effect on the germination of the seed and if more than 1cwt. an acre is used, carbonate of lime should be mixed with it in equal proportions. The use of either this mixture or reverted superphosphate will overcome the effect on germination.

In the drier regions, such as most parts of Canterbury, not more than 2cwt. an acre of phosphate should be applied, but in heavy-rainfall areas greater quantities can profitably be used.

Blood and bone manure and superphosphate mixed in equal proportions is a good fertiliser for rape, as the nitrogen assists in vigorous leaf formation.

Sowing Pasture with Rape

The sowing down of pasture with rape is very common, and where that is done no addition of mustard or turnips is necessary. Very frequently, however, the error is made of sowing too much rape with the grass seed mixture, for if a really strong crop of rape is secured the grass and clover will suffer. It is quite common for pasture to be sown down with 2lb. or more of rape seed an acre, whereas it is unwise to sow more than 1lb. to the acre. Experience has shown that where relatively-heavy seedings of rape are used full productivity of the pastures, as measured in grass seed yields, is not secured until the second or third harvest. Normally, the first harvest should be the heaviest.

Subsequent Cultivation

Cultivation of growing rape, apart from ridged crops, is not common. In North Canterbury, however, some cultivation of the ordinary crop sown in 7in. rows is carried out, tine harrows being used.

The crop is harrowed when it is about 4in. high. Crops treated in this manner must be seeded at a heavier rate to allow for some loss of plants during harrowing. The loosening of the surface soil accelerates the growth of the rape, especially when the surface of the soil has caked after rain.

Grazing Management

Rape is a palatable and nutritious crop that gives excellent results when correctly managed, but if care is not exercised in the grazing management, serious loss can result, because under certain conditions digestive disorders are likely to occur in lambs feeding on the crop. When rape is immature or conditions are wet the protein content of the crop is very high, and that, with the soft nature of the fodder, leads to scouring and excessive heating of the blood.

These factors have led to the adoption by farmers of many and varied practices in the grazing management of rape. One farmer insists on providing a run-off for the lambs; another declares that this is a disadvantage and leads to slower fattening. One provides water in the rape paddock, while his neighbour fences the water trough off. Hay may be fed as a supplement to the rape by one farmer and not by another.

There is no one correct method. As in other departments of farming, the successful farmer adjusts his methods to the conditions.

To produce best results rape should be allowed to reach maturity before grazing begins. Maturity is indicated by the extending of a bluish tinge across the surface of the leaf. At that stage rape is a well-balanced food and requires no supplement apart from the mustard, turnips, or whatever else was sown with the crop. If the crop is green and immature, or if a period of wet weather intervenes during grazing, some supplement like hay, chaff, or a suitable run-off is necessary to restore balance to the diet. Similarly, with second-growth rape the provision of a supplement to the diet by feeding hay or allowing a run-off is usually necessary, or at least beneficial. The second growth is usually grazed when it is immature, and the addition of some supplement is necessary to restore balance to the diet.

In the provision of a run-off care should be taken to avoid old permanent pastures which may be infested with parasitic worms. Young pasture or clean growth after the taking of a hay crop is suitable. The feeding of some such supplement as good lucerne or clover hay in racks in the rape paddock serves the same purpose as a run-off—in fact, the provision of supplementary fodder in the paddock is often better than the run-off method, for if too much time is spent on the run-off, the growth rate of the animal is depressed.

In Canterbury, where the rape-grazing period is usually dry, a method which has given good results is the closing of lambs on rape without water, run-off, or supplements. For the success of this method certain conditions are necessary: First, the rape must be properly mature when fed; second, mustard, turnips, lupins, or other suitable material should be grown with the crop; third, no continued wet weather at the time of grazing.

The provision of water appears to offer no advantage under average conditions, but shade is beneficial.

Influence of Sowing Method

The grazing management of rape is partly connected with the sowing method. Sowing should be planned to produce crops maturing at intervals of about a fortnight. Though that is not always done, it is the ideal to be aimed at, for, if the grazing period of a large area is too extended, part of the crop will have advanced beyond its best nutritive value. Further, it is toward the end of the growth of the crop that insect pests such as aphides do the greatest damage, and for that reason also it is important that the crop be eaten off as soon as possible when maturity is reached.

Once a break has been fed off it should be closed to grazing. Merely shifting the break fence on and allowing the lambs to run back over the fouled ground is bad practice. On the contrary, second growth should be allowed to come away for further grazing later. Second growth of this nature, which can become available for feeding as early as three weeks after the completion of the initial grazing, is valuable as a flushing crop for ewes before tupping. Farmers have found that such feed improves their lambing percentages.

Sheep should never be put out to graze rape when hungry, as that is likely to lead to digestive disorders.

The time taken for lambs to fatten on a rape crop varies considerably with the condition of the rape and the condition and breed of the lamb. However, even forward Romney-Southdown cross lambs can seldom be fattened in less than four weeks, and backward lambs under poor conditions may take three months.

The number of lambs fattened to the acre also fluctuates widely, but a good crop under good conditions will fatten 30 head an acre. In a grazing trial with Broad Leaf Essex II more than 50 lambs an acre were fattened, but that is exceptional.

Club Root Disease

The principal disease affecting rape is club root. This disease, which affects all cruciferous crops such as swedes, turnips, and cabbages, producing swellings in the roots, is soil borne and cannot be carried in the seed. The spores, which carry over the disease in the soil, can remain viable for three to five years. Other cruciferous plants such as wild turnips and shepherd's purse may carry on the disease in the absence of sown cruciferous crops.

On infected land it is advisable to refrain from sowing cruciferous crops closer to each other in the rotation than six years. However, if the farmer desires to sow a crop on infected land, some control of the disease can be secured by applying carbonate of lime at the rate of three tons an acre three months before sowing. The lime should not be mixed with a phosphatic fertiliser when used for this purpose. Before the war promising results in the control of club root were being obtained from the use of mercurated phosphate, but supplies of this material are not available at present.

Insect Pests

Four insect pests of rape call for special mention, but the one that does most damage is probably the aphis. The blight caused by this insect can play havoc with a crop of rape in a very short period because of its very rapid breeding. Each female usually produces 10 or more young, and these reach sexual maturity in from 10 to 20 days, when they produce a fresh batch of young. In the normal breeding season from November to March it is possible for one individual to produce about 1,000,000 offspring.

The aphis does its damage by sucking the juices from the plant. In a badly-infected crop all the vitality is sapped from the plants, which rapidly yellow and die. Aphis damage is usually worst in dry conditions, as the plant is then less able to outgrow the infection.

There is no simple control for the blight on a field scale, but certain methods can be adopted to reduce its effect. One is to sow rape in breaks so that it may be fed off rapidly before the concentration of aphides reaches serious proportions. With one large sowing much loss will be sustained during the long grazing period if aphis infection is bad. If an infected crop is grazed off closely, the aphides will be killed off because of lack of food, and second growth from the crop will then be free from the insect. That would appear to be an argument in favour of the use of Broad Leaf Essex rather than Giant, which makes practically no second growth.

Various parasites attack aphides, but they do not usually gain ascendancy till the autumn.

Larvae of the diamond-backed moth and the white butterfly cause much damage to all cruciferous crops. The large larvae of the butterfly eat pieces completely out of the leaf, but the grub of the moth usually leaves the upper surface of the leaf intact and feeds on the lower fleshy part.

As in the case of the aphis, damage by these two pests is most serious during dry, hot summers, when the weather is ideal for rapid breeding. However, the activities of both the white butterfly and the diamond-backed moth have been greatly curtailed in recent years by parasites released to control these pests.

The other pest which occasionally causes damage to the rape crop in the seedling stage is the brown beetle. This insect, which is the adult stage of the common grass-grub, is on the wing mainly during November and December, and in seasons when the pest assumes serious proportions rape and turnip crops in the seedling stage are often badly damaged.

Summary

Rape is grown extensively in New Zealand for the fattening of lambs after weaning, and it is the best crop for this purpose. It may be grown satisfactorily on a wide range of soil types. Highly-productive strains have been bred to meet different requirements, so it is important to sow Certified seed. Thorough cultivation and sound cultural practices pay handsome dividends in the returns obtained from the crop.

Care is necessary in the grazing management of rape and methods must be adjusted to meet alterations in conditions. Disease and insect pests at times may play havoc with the rape crop, but suitable management can at least reduce the risk from such sources. Plant breeders are also playing their part by producing resistant strains.

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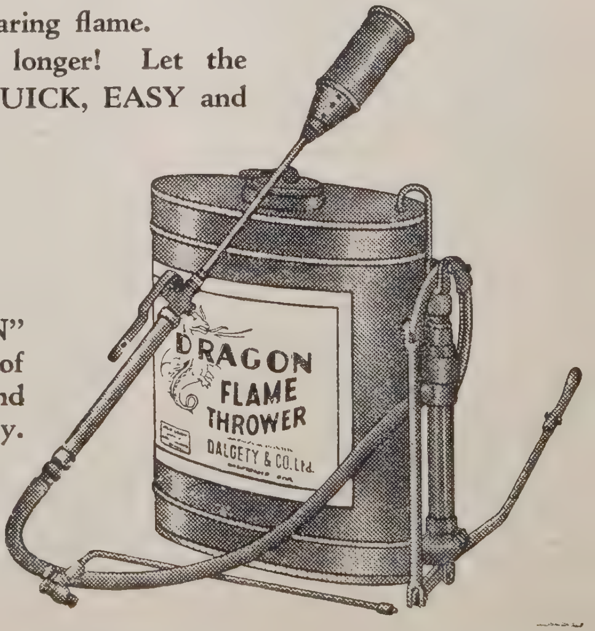

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Third Year of Poultry Flock Improvement Plan

By F. C. BOBBY, *Superintendent of Poultry Husbandry, Wellington.*

THE New Zealand Poultry Flock Improvement Plan is now in its third year, and it is particularly satisfactory that a further substantial increase in the number of breeding flocks can be recorded for 1947. The years during which the plan has been in operation have been difficult ones for the poultry industry, and some falling off of interest during the past two years would not have been surprising. But interest has increased and progress has been well up to expectations taking the over-all picture of both islands.

[Green and Hahn Ltd. photo.

RESULTS to date may be appreciated from the following table showing the numbers of breeding flocks accredited:—

Area	1945	1946	1947
Auckland (including Whangarei, the Waikato, and the east coast)	3	6	27
Wellington (including Taranaki, Manawatu, Hawke's Bay, Gisborne, Blenheim, and Nelson)	13	*41	*50
Canterbury-Westland	3	6	6
Otago-Southland	9	18	23
Dominion	28	71	106

* Including one accredited hatchery.

Two of the results for 1947 call for comment. The much-increased figure for the Auckland area marks welcome progress made in this area, as Auckland Province has the largest poultry population in the Dominion.

On the other hand, the important poultry centre of Canterbury is only maintaining its previous figure, which is the lowest for New Zealand. Obviously during the coming year an appeal must be made to poultry producers in Canterbury, who must be impressed with the fact that such an appeal is made in their own best interests.

Another aspect of the results during the years under review is of interest and importance—the greatly-increased numbers of flocks accredited as compared with the numbers of applications for accreditation. The following table shows figures for the Dominion:

	Number of Applications	Number of Flocks Accredited	Percentage Accredited
1945	97	28	28.9
1946	133	71	53.4
1947	138	105	76.0

These figures, with the details of those who have applied for accreditation, indicate that a number of producers who in the first instance failed to attain the necessary standard with their breeding birds have now graded up their flocks to accreditation level. Therefore the plan is achieving one of its major objects—to induce flock owners to improve the quality of their stock.

Of the 28 flocks which were accredited in 1945, only five do not appear in the 1947 list; of these five, two flocks are known to have been broken up and sold. Of the 71 flocks accredited in 1946, 14 do not appear in the 1947 list. These figures indicate that a great majority of producers under the plan are coming forward each year for accreditation.

Breeding Birds Accredited

The 105 breeding flocks accredited contain a total of 26,673 breeding females, or an average of 254 accredited females to each breeding flock. Similar figures for 1946 gave 14,838 breeding females, an average of 212 to the flock. The following table shows how these birds are distributed over the Dominion this year:

	Flocks	Accredited Females	Average per Flock
Auckland	27	8546	317
Wellington	49	9426	192
Canterbury-Westland	6	2712	452
Otago-Southland	23	5989	260

The number of breeding females accredited in 1947 was nearly twice that for 1946.

The figures which follow show that by far the greatest number of birds to be accredited are White Leghorns:

White Leghorns	24,557
Australorps and Black Orpingtons	1,800
Rhode Island Reds	55
Barred Rocks	56
Khaki Campbell ducks	150
Muscovy ducks	55
Total	26,673

Conditions for 1948

As in the past three years, a pamphlet setting out the conditions under which the plan will be operated in 1948 will be sent to all owners of accredited flocks in 1947. With this pamphlet will be included a form on which to apply for accreditation. Any interested poultry breeder whose flock is not accredited, and therefore is not on the mailing list for information about the plan, should get in touch with the Poultry Instructor for his district or write to the Department of Agriculture, Box 3004, Wellington.

Two amendments to the 1947 conditions recommended by the annual Dominion poultry conference last March referred to the minimum weight for White Leghorn breeding stock and the present clause which permits of a breeding flock containing 25 per cent. of pullets. Further comments on these amendments will be made at the time of issuing the conditions for 1948.

The Dominion conference also discussed the suggestion that owners of accredited flocks should in future be linked with the four provincial associations of Auckland, Wellington, Canterbury-Westland, and Otago for the purpose of having a direct say about recommended amendments to the conditions under which the plan is administered. That suggestion was agreed to, and the best method of effecting this change of policy is now being considered. It would appear to be an obvious step in the right direction and one visualised by the committee responsible for formulating the conditions under which the plan was launched. Such a recommendation was not practicable originally because the number of accredited flock owners was so small—28—and these producers were widely scattered. Today the position has altered, and accredited flock owners can and should take a direct part in controlling a plan which affects their poultry-breeding operations to such a degree. These owners may expect to hear more of this development in the near future.

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SUPPLEMENTARY FEED CROPS FOR STOCK

By **P. R. BARRER,** *Instructor in Agriculture, Christchurch.*

SATISFACTORY provision of feed for stock by grass or grass products alone is not possible in most of the South Island and in parts of the North Island. In the most favourably-placed areas climatically in the North Island the economics of growing crops especially for supplementary feed for stock may be questioned by many farmers. On the other hand the cost of growing such crops may be balanced against the years when drought conditions, facial eczema outbreaks, and other nutritional disorders cause losses. It is possible for good farmers on well-run farms to balance out the uneven growth of grass by the saving of hay and silage, by rotational grazing, and by wise methods of management of both stock and pastures. However, there are also many farms where there are periods of excess pasture growth which is not utilised, and periods when stock are on very short commons, and in bad years even virtually starving. It is on such farms that regular provision of supplementary feed crops other than hay or silage may prove well worth while. Also, whenever the renewal of pasture by breaking up and resowing is necessary, the intermediate growing of supplementary feed crops becomes a more payable practice, irrespective of other factors.

ON a great number of farms the success or otherwise of feed provision for 1948 will depend on cultivation and sowing work undertaken during the next few weeks. Many main feed crops are sown in October and cultivation work for crops sown later should be well under way. Too much emphasis cannot be laid on the necessity for thorough cultivation; poor cultivation can nullify the effects of sowing good seeds and proper fertilisers. If crops are to be grown, they are worth growing well; a 60-ton crop of roots is three times as valuable as a 20-ton crop, and the only difference may be care taken in cultivation.

Following are some notes on particular crops for the benefit of those intending to sow in the coming season.

Maize

The maize plant does best under warm conditions of high fertility on soils which may be classed as deep, friable loams well supplied with organic matter. There is considerable district variation in the sowing of the crop, which is not sown until danger of frosts is past, usually from mid-October to the end of November. The east coast districts of the North Island and Auckland are the main maize-growing areas. If the plot is small, maize may be sown "on the square," the width between plants varying from 2ft. to 3ft. 6in., a marker being used and the seed sown either by hand or with an automatic hand-planter. For larger areas seed may be sown with a single or double-row maize or ordinary grain drill in rows 2ft. to 3ft. apart with the seed 18in. apart in the rows.

Maize may also be sown as a greenfeed crop for cows during a dry summer and autumn. If the summer is wet, the crop may be converted into high-quality silage. For greenfeed from 1 to 3 bushels of seed may be drilled in 7 to 21in. rows or broadcast. Marigold and Hickory King are favourite varieties for greenfeed.

Japanese Millet

Japanese millet is not commonly grown, but like greenfeed maize it can be sown from October to December for use as a greenfeed crop for dairy cows in a dry summer

Carrots are a high-quality root crop, and on free-working loams yields of up to 70 tons an acre are possible. Guerande is one of the favourite varieties.

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or autumn. It is usually drilled in 7in. rows at 20 to 25lb. an acre.

Pumpkins

Pumpkins are suited by the same soil and climatic conditions as maize. They are also best sown on the square, the squares being marked out by driving a hayrake or broadcasting box in two directions across the area and planting 2 or 3 seeds at each corner where the wheelmarks intersect, usually 8 to 12ft. apart. The seeds may also be dibbled in in "hills" in which farmyard manure has previously been incorporated. Cattle pumpkins are a useful crop for pigs, dairy or beef cattle, and sheep.

Carrots

On free-working loams the field carrot is capable of yielding up to 70 tons an acre. Carrots are a high-quality root crop and are valuable for all classes of stock. From 1 to 2lb. of seed is usually sown in October on the flat or in ridges in rows 14 to 28in. apart. As the seed is light, it is best mixed with an equal quantity of moist sand five to six days before sowing. For sheep the Guerande variety is a suitable one which may be fed off in situ.

Mangolds

Though the mangold crop has declined in popularity of recent years, perhaps because of the labour in thinning, weeding, and harvesting the crop, it is still one of the most valuable root crops for winter feed for dairy cows, giving the highest yields per acre of any root crop. It does best on deep, fertile loams or river silts. It is usually sown in October at 4lb. of seed to the acre in rows 21 to 30in. apart. It is a reliable crop if given good treatment and is not subject to any serious disease.

Sugar Beet

Sugar beet is closely related to the mangold, but although yields are not so heavy, sugar beet is richer in food value, having double the dry matter content of the mangold. It may be sown similarly to mangolds. It also has the advantage that it can be fed with perfect safety at all stages of growth. It is a particularly useful crop for pigs and dairy cows.

Chou Moellier

Chou moellier is sown in a variety of ways in different districts. It may be sown in drills or ridges from 7 to 28in. apart at the rate of 1 to 2lb. of seed an acre. On fertile soils sowings in from 14 to 21in. rows usually give higher yields than 7 or 28in. rows. On lighter land where the crop is to be fed off to sheep 7 to 14in. rows may be preferable. Chou moellier may also be sown with swedes in alternate coulters. The crop may be sown at any time from September to December. Early-sown crops of chou moellier may be used for feeding off if necessary from January to March, but the crop is generally used for the late autumn and early winter period of shortage. On dairy farms the crop will tide stock over until mangolds can be used. On fertile land heavy crops of 50 to 60 tons an acre of chou moellier may be obtained, but even on lighter land a crop of 20 tons to the acre is a useful supplement for sheep or cattle. It is not so subject to disease as other brassicas. The crop is used for dairy cows, beef cattle, or sheep, and may be used for lamb fattening.

Thousand-headed Kale

Thousand-headed kale is more widely grown on poorer soils than chou moellier. It is usually sown in 7 or 14in. drills, and as it is grown on lighter land it is more frequently used for sheep than for dairy cows. It may be sown in October and used for feed in the autumn, from which grazing it usually recovers to give useful feed again in the spring. Like chou moellier it may be used for a maintenance ration or as a lamb-fattening crop.

Chou moellier, which is not as subject to disease as other brassicas, is increasing in popularity on both dairy and sheep farms, where it is generally used during feed shortage in late autumn and early winter.

Rape

Rape is still the main crop in New Zealand for fattening lambs, though its popularity has declined a little because of its liability to attack from diseases and pests. It is usually sown in 7 or 14in. drills. It may be sown with mustard or sweet blue lupins to counteract "scalding" tendencies. It is best sown in "breaks" to fit in with the requirements of the lambs. As feeding over-ripe or under-ripe rape is not advisable, the crop should be sown from 8 to 12 weeks before it is required and fed off at the correct stage. As with other brassicas it should not be sown when it is liable to attack from the brown beetle which is in flight usually in November and December. October sowings and late December or January sowings in most districts are less liable to severe attack.

Swedes and Turnips

Swedes and turnips have also declined in popularity in some districts because of their liability to attack by diseases and pests. The New Zealand Resistant swede and the New Zealand Purple and Green Resistant Yellow-fleshed turnips, however, are largely resistant to club root, and Sensation swede withstands aphis and diamond-backed moth better than most other varieties. Swedes and turnips may be broadcast, sown in 7 or 14in. drills, or in 26in. drills or ridges.

With all brassicas—swedes, turnips, rape, chou moellier, and kale—germination injury must be avoided, and it is advisable either not to sow the seed in contact with the fertiliser or to use a reverted superphosphate made several days before sowing by mixing 2 parts of superphosphate and 1 of lime. Serpentine superphosphate may be used instead of this mixture of superphosphate and lime.

Rape should be sown when the brown beetles are not in greatest numbers, which may entail postponement of the sowing of swedes and yellow-fleshed turnips until December, though soft turnips may be sown in early October for feeding off as early as January. Soft turnips for late feed may also be sown in January or even February in some districts.

There is a large range of supplementary feed crops, and in addition to the main ones previously mentioned other requirements may be met by sowing barley for grain, which is particularly useful for pigs, oats for grain or chaff, greenfeed oats, barley, and ryecorn, artichokes for pigs, peas, which may be used as grain for pigs or sheep, and blue lupins and sweet blue lupins. There is at least one crop to suit a particular purpose on a particular soil.

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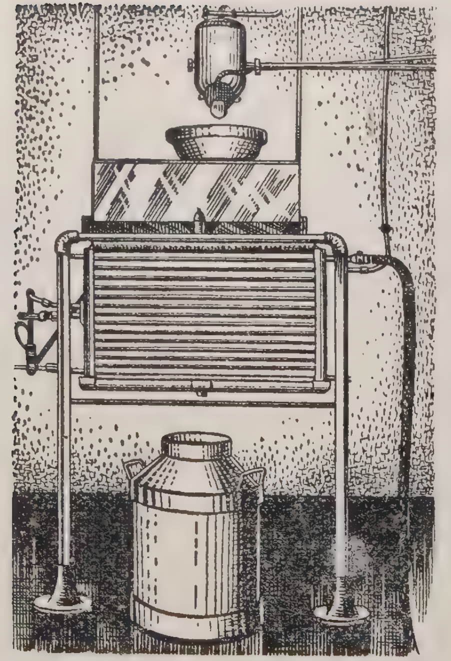

Garden Culture of the Gladiolus

NEW ZEALAND'S bright sunshine has enabled plant breeders to make the gladiolus the favourite summer flower, and the reputation of the varieties raised stands high. This article by J. P. Hudson, Horticulturist, Wellington, describes the garden culture of the gladiolus and deals with the raising of new varieties and common pests and diseases in the plant.

HISTORY AND BOTANY

THE garden gladiolus has a very short history compared with many favourites which have been popular for centuries. A number of gladiolus species, especially scented ones, were known and grown in European gardens in the sixteenth century, but it was not until the South African species were hybridised by French growers in the early nineteenth century that garden varieties became popular.

The modern garden hybrids came even later, after the discovery of *Gladiolus primulinus* in Central Africa in 1887, although the importance of the introduction was not realised at the time. This gladiolus, sometimes called The Maid of the Mists, grows wild near the Victoria Falls. Each flower has a hood which is said to shield the anthers from the spray of the falls, so keeping the pollen dry.

G. primulinus was sent to England about the beginning of this century by the engineer who built the railway bridge over the Zambesi River, and by 1908 Messrs. Kelway, of England, and Lemoine, of France, had produced the forerunners of the grandiflorus and primulinus hybrids which are now commonly grown. These new types were developed by crossing the former garden varieties, derived mainly from the Ghent gladiolus (*G. Gandavensis*), with *G. primulinus*, the latter introducing several new and most desirable characteristics of flower colour, shape, and habit.

Derivation of Name

The name "gladiolus," derived from the Latin *gladus*, meaning a sword, was given to the flower because of its sword-shaped leaves. Gladioli used at one time to be called "sword lilies," but this is not a particularly good name, as they belong to the iris family (*Iridaceae*) and not to the lily family (*Liliaceae*).

Most of the wild gladiolus species are found growing in the southern part of the African continent, especially in areas where hot, dry weather and a baking soil discourage plants from growing at some seasons of the year. Many plants growing in these conditions have some sort of underground organ in which food can be stored from one growing season to the next, so that each plant can die down when the hot weather comes, but grow and flower as rapidly as possible in the next rainy season.

The gladiolus produces a special form of underground storage organ known as a corm, which consists of a round, fleshy structure surrounded by papery outer scales. It has been said that this is an ideal shape for surviving in hard dry ground, as it is not damaged if the ground cracks open.

When rain moistens the warm earth in the growing season feeding roots grow in a fringe around the base of the corm, and one or sometimes two buds on each corm start to grow into spear-shaped shoots which push their way through the soil. The young flower buds develop quite early inside the shoot, but not until after it actually starts to grow, unlike plants with bulbs, such as daffodils, where the flower bud is developed inside the bulb while it is still dormant.

The flowers produce abundant seeds, which serve to spread the species, but each plant also perpetuates itself by producing new underground corms. This is most important to the gardener, as named varieties of gladioli do not come true to variety when grown from seed and can be grown only from corms produced in the previous season.

Cormlets

Six weeks or so after the shoot starts to grow a new corm begins to develop at its base immediately on top of the original corm, which gradually shrivels up. By the end of the

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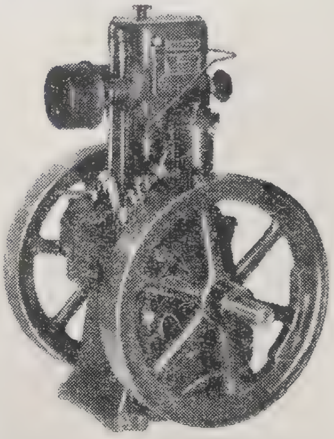

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growing season the new corms are fully grown, but are still attached to the shrivelled, dead, old ones (Fig. 1).

In addition to the new corm produced at the base of each shoot a number of very small corms also grow, clustering at the junction of the old and new corms. These are called "cormlets," "peas," "spawn," and "seed," although they are not, of course, true seeds. Cormlets is the most accurate term and fortunately the one in most common usage. Injury to a corm before planting often results in far more cormlets than usual being produced. This habit is sometimes used by gladiolus breeders to increase their stock of a new variety as rapidly as possible.

For some reason large corms are often referred to as "two-year-olds" and small ones as "yearlings." This may possibly be correct as applied to plants raised from seeds, but is very confusing when applied to corms of ordinary varieties, as new corms are formed every year and no individual corm is ever more than one year old.

Contractile Roots

Toward the end of the season a second crop of roots is produced from the junction between the old and new corms. These roots, which at first are thick and fleshy, start to shrink after anchoring themselves firmly into the soil (Fig. 1). The shrinkage has the effect of drawing the new corm down into the soil to about the same depth as the original one as the latter shrivels up. Many other plants produce these so-called "contractile roots," which ensure that the plant's storage organ remains at a safe level in the soil.

Seeds, of course, are scattered on the surface of the soil, but soon after they germinate each produces a tiny corm which is pulled into the soil by means of contractile roots and pulled down a little deeper each succeeding year until it is at the proper level.

CULTURE IN THE GARDEN

Situation

Gladioli are sun-lovers, and perhaps this is one of the reasons why they grow so well in New Zealand, where they get abundant bright sunshine. A sunny, warm place should always be chosen where trees or buildings do not shade much sunshine from the plants. Shelter from strong winds is an advantage, mainly because it is much more difficult to support the flower spikes in exposed places.

Garden gladioli will not tolerate a badly-drained soil during their growing season, as waterlogging causes serious damage to their root system. The site chosen for growing them commercially or in the home garden should be drained sufficiently well to prevent the water-table rising near the surface even during prolonged rains.

Unfortunately, gladioli are susceptible to several diseases which may be soil-borne, and it is unwise to grow them again for at least two or three seasons in an area where a batch has been badly diseased. Provided the previous crop was healthy, however, and the ground adequately prepared and manured, there seems no reason why gladioli should not be planted again, although it is probably better to plant in fresh ground if any is available.

Soil

Gladioli can be grown with success on light, medium, or heavy soils, as soil texture is not as important as other factors such as adequate drainage in wet weather and a constant supply of moisture in the soil throughout the growing season. Gardens newly made from grass paddocks usually produce first-class gladioli, as the fibrous soil seems to suit them.

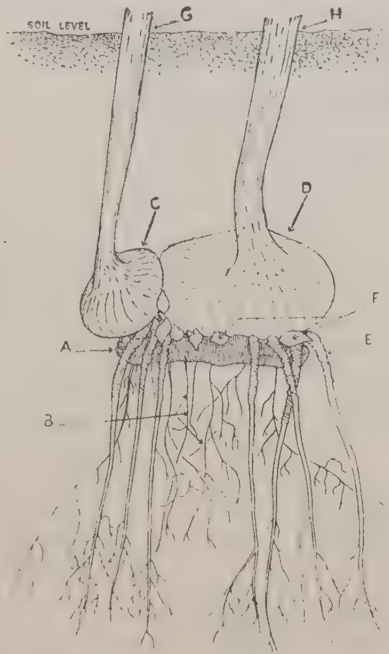

Fig. 1—Gladiolus toward the end of the growing season. The corm originally planted (A) has shrivelled up, together with the feeding roots (B) which it originally produced. Two of the buds on top of the original corm grew into shoots (G) and (H), at the base of each of which a new corm has now developed (C) and (D). In addition, a number of small cormlets (F) are clustered at the junction between old and new corms. Thick fleshy roots (E), which grew from the base of the new corms, are now contracting (note the concertina-like effect at the top of each root) and are drawing the new corms down to the same level as the old one originally occupied.

The gladiolus is said to grow best in a soil which is very slightly acid, and there is no need to lime soils unless they are very acid.

When gladioli are grown as a main crop the site is best dug or ploughed deeply in the autumn and left loose and rough through the winter to ensure that all the winter rain soaks into the ground and does not run off the surface. It will then be in ideal condition in the spring, when the surface may be cultivated to bring it into planting condition, but it should not be re-dug or ploughed, as gladioli succeed best in a soil which has had time to settle after being disturbed. These ideal preparations cannot usually be made, however, in the home garden, where gladioli have to take their place in mixed borders or alternate with spring flowers, but even then it is important to keep the surface soil loose through the winter and to dig as deeply as possible whenever the bed or parts of it are vacant.

Manurial Programme

Dressings of old, well-rotted animal manure, compost, green manure, or other form of organic matter are worth using on any soil, light or heavy, as they greatly improve its texture and condition. It is said that dressings of fresh animal manure may do harm to gladioli, especially if the corms come into direct contact with the manure when planted, but liberal dressings of manure worked into the soil some months before planting can do nothing but good.

There is little experimental evidence on which to base recommendations for fertilisers. American work seems to show that phosphatic manures are the most important and that superphosphate gives better results than bone meal. If that is so in the United States, it is also likely to be true in New Zealand, where soils are often very deficient in phosphorus. Nitrogen is said to produce longer spikes and larger flowers, to delay maturity somewhat, **and to reduce the number of new corms produced**. The last point would be important to raisers and nurserymen, but there is no available evidence of the effects of fertilisers on gladioli in the Dominion.

Until more is known about the particular requirements of gladioli under New Zealand conditions it is suggested that a dressing of 3 parts by weight of blood and bone, 2 parts of superphosphate, and 1 part of muriate of potash applied over the whole bed in early spring at 2oz. a square yard should provide the plant foods required in about the correct proportions and in the most suitable form.

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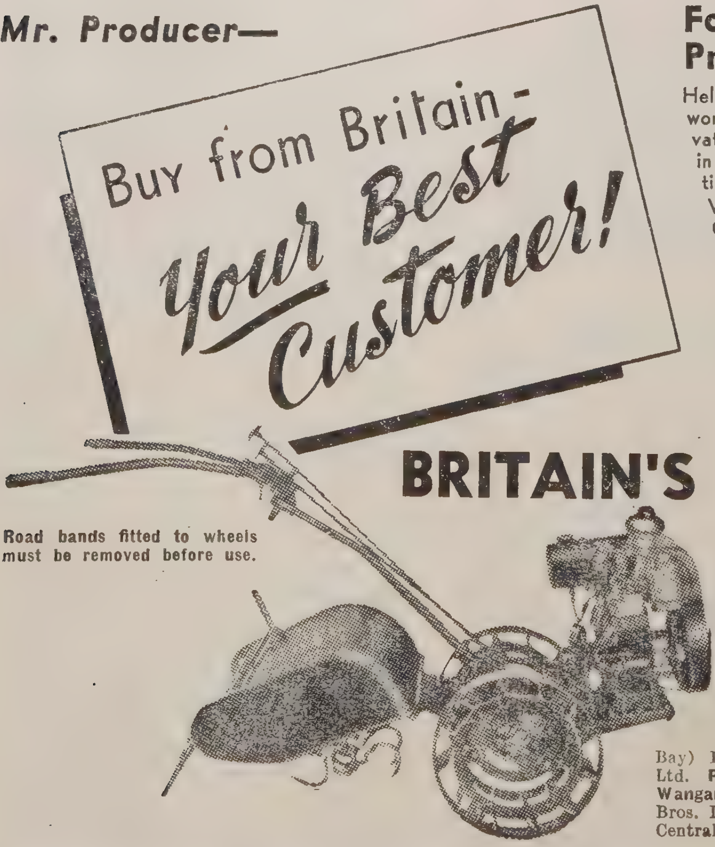
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Preparing Corms for Planting

Average-sized corms should each produce one flower spike. Very small corms, less than ½in. or so in diameter, and cormlets (see Fig. 1) do not usually flower, but produce leaves and a larger corm which will flower in the following year. Very large corms with two or more large buds or eyes on top should be cut up before planting; each piece with a large eye, and preferably a piece of the base plate, should grow and flower perfectly well. If planted without being cut, very large corms often produce two or three spikes of inferior flowers.

There is some controversy as to whether the skins of corms should be peeled off before they are stored, but it is certainly worth while to skin the corms shortly before planting. Though this is not essential, it has the advantage that it enables diseased corms to be recognised and discarded before planting. It is important that only sound, healthy corms should be planted, as the gladiolus suffers from several troubles which unfortunately may be carried over in the corm from one season to the next.

Any corms showing a bad scar, a rotten place, or lumps and scabs should be burned. It is folly to plant them and so perpetuate the disease and perhaps contaminate a fresh piece of land. Small scars or scabs may be cut out with a knife if the corm is too valuable to be destroyed, but it is very easy to overlook a few small infections on apparently-healthy corms.

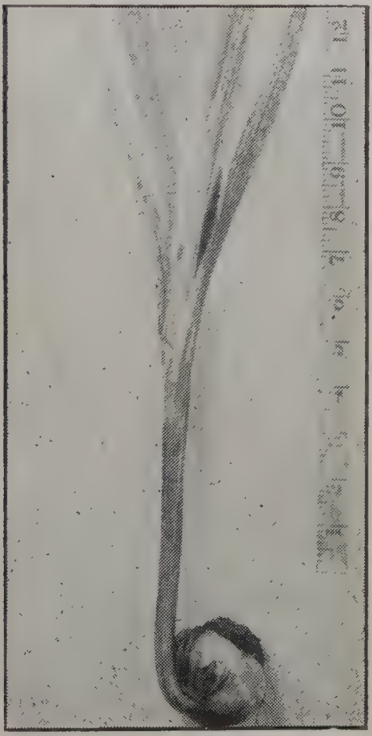

Fig. 2—A gladiolus corm planted upside down will still grow and produce a new corm, but corms are better planted the right way up.

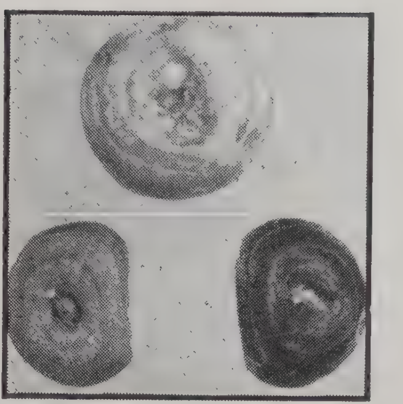

Fig. 3—Gladiolus corms after being husked. Note the concentric scars where the "husks" (the bases of last year's leaves) were attached to the corms, and the prominent "eyes" on top of each corm. The flat sides of the lower corms indicate that two corms were produced side by side on top of a single corm.

For this reason, and especially when new stocks are purchased, it is a wise routine precaution to dip all the corms just before planting in a solution of 1 part of acid mercuric chloride to 1000 parts of water. Leave the corms in the solution for 1 to 2 hours, drain, **allow them to dry,** and plant at once. A fresh dip should be used for at least every five or six batches of corms, topping up with fresh solution as necessary. If much soil is introduced and the solution becomes dirty, it should be changed more often. Proprietary mercurial preparations now on the market have also given good results when used as a dip before planting.

Dipping should be done in a glass or wooden container, and care should be taken, as the mercuric chloride is highly poisonous. A solution of the right strength can be made by asking a chemist to dissolve 10 grammes of mercuric bichloride in 25 c.c. of concentrated hydrochloric acid. Add this stock solution to 2 gallons of water to make up a dip of the required strength.

Planting Out

In the home garden corms are usually planted individually with a trowel, but the commercial grower opens a furrow with a plough, places the corms in the furrow, and then turns the next furrow over on to them. Commercial growers overseas, who plant in beds, use a specially-made hoe with a blade 2in. wide and 4in. high to draw out a narrow drill in which the corms are planted. The depth of planting should be varied according to the size of corm and the type of ground.

It is an advantage to plant large corms up to 6in. below the surface in deep, light, well-drained soil, but the same corms should not be put deeper than 2 or 3in. in heavier shallow soil. Small corms may be planted from 1½ to 3in. deep according to the nature of the soil.

If clean, sharp sand is available, up to half a handful can be put at the bottom of each hole, and the corm placed on top of it. This is a widely-advocated practice, but it is not followed by commercial growers and is of rather doubtful advantage apart, perhaps, from making it easier to lift the corm and cormlets at the end of the season.

Gladioli are planted in rows by commercial growers and by the home gardener who grows them for cutting. The minimum spacing should be 6 to 8in. between plants in rows 2ft. apart, but they should be spaced more widely apart in the rows if large blooms are required.

When grown for garden display gladioli are best put out in clumps among other plants, each corm being planted 6 to 8in. from its neighbour. Gladioli are valuable for planting in among shrubs or herbaceous plants and can also be used effectively in borders of mixed bedding plants.

Long Succession of Flowers

A long succession of blooms can be obtained by planting corms from late winter (August) onward in places where there is no serious risk of severe frost.

The main planting is best made in September or October, however, as corms are liable to fail if planted before the soil is warm and in reasonably-dry condition. A few corms may be kept for late plantings in November to extend the period of flowering, but these often produce disappointing results if the growing period coincides

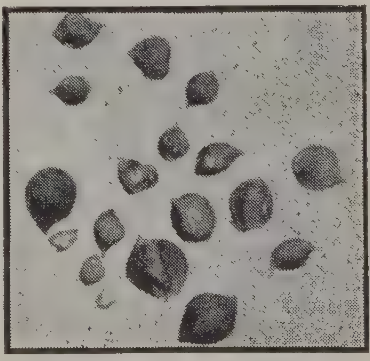

Fig. 4—Gladiolus cormlets (about natural size).

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with a long, hot dry spell, when thrips are especially troublesome.

Corms used for the late planting should be stored beforehand in a cool place like a cellar, or even in the domestic refrigerator, until required for planting.

Green shoots may start to sprout and develop in stored corms, especially if the storage conditions are too warm. Although premature sprouting does not seem to affect the development of the plant seriously, sprouted corms should be planted as soon as practicable.

Cormlets should be planted early (in July or August) as soon as the ground is dry enough and in suitable condition for working so that they can have the longest possible growing season in which to produce corms of flowering size for the following year. Plant cormlets about 1in. apart in drills drawn 1 to 2in. deep.

Cultivation in Summer

Gladioli do not thrive in competition with weeds, especially in dry spells when they need all the moisture which the soil can supply. Hoe frequently between the plants and rows to keep the surface loose and prevent weeds from developing. When gladioli are planted in beds it is advisable to sow a few radish seeds along the rows. The seedlings will mark the position of the rows before the gladioli show and enable inter-row cultivation to be done much earlier.

Soil can be drawn up to the rows as the gladioli grow to give them added support. This is especially worth while in large commercial beds where the plants are not staked, but soil between the rows should not be moved so deeply that gladiolus roots are severed.

Staking

In sheltered places gladioli will often stand without being staked, but they are always liable to be blown over by a summer storm. Where high winds are likely it is therefore wise to stake them not later than when the flower spike first shows through the leaves. The simplest method in the garden is to put a stake behind each corm when it is planted, although this is apt to look unsightly in flower beds, and it is more usual to wait until the foliage has grown before staking, driving each stake into the ground 2 or 3in. away from the stem to avoid any damage to the corm and reduce injury to the roots.

Each plant should be tied to the stake just below the bottom flower and in exposed places a second tie may be put half-way up the flower spike, but it must be loose enough to draw up the stake as the flower spike lengthens. Gladioli grown in rows can, of course, be supported by a system of posts and wires.

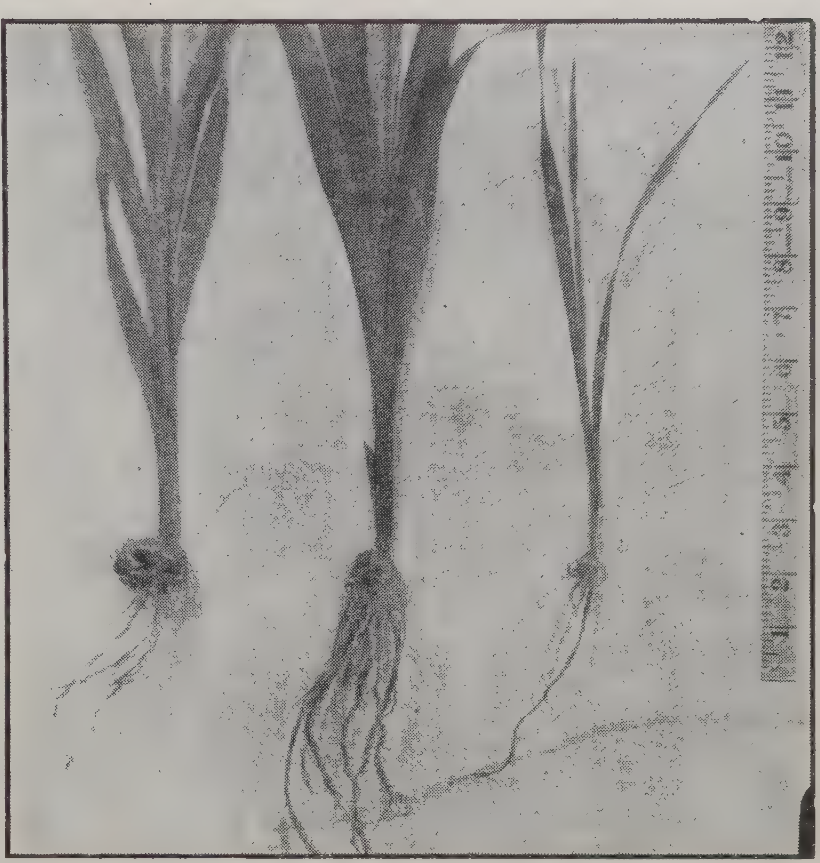

Fig. 5—Plants produced from cormlets. The corm on the left should flower next year, but those on the right are unlikely to do so. Note the thick, contractile roots and the cormlets clustered round the base of the left-hand corm.

Watering and Feeding

It should not usually be necessary to water gladioli if the soil is deep and reasonably well supplied with humus. If the weather has been exceptionally dry, however, it may be necessary to give the beds a thorough soaking with water from time to time, especially from the time the flower spike can first be felt inside the leaf sheaths. Liquid manure, made by soaking a sack of fresh animal manure and soot in water for a few days and diluting to the colour of weak tea, can be used with advantage every 14 days. Alternatively, a topdressing of superphosphate and sulphate of ammonia applied at the rate of ⅓oz. of each to the square yard and well watered in at this stage will do much to increase the size of flower spike and bloom.

As soon as possible after each watering the soil should be cultivated with a hoe to prevent the surface layer from caking. No further watering should be necessary after the flowers fade.

During hot and dry summers a surface mulch of grass mowings or compost between the plants will be beneficial in addition to periodic watering. The mulch helps to keep the soil cool, conserves moisture, and reduces cracking.

Dead Flower Heads

Where gladioli are grown for garden display faded flowers should be broken off as the petals droop over. This conserves the energy of the plant, which may otherwise start to develop seed pods, results in better development of the top flowers in the spike, and also makes for tidiness, as nothing looks worse than drooping gladiolus flowers. When the last of the flowers fade the spike should be cut off just above the level of the top leaves (C in Fig. 6), leaving the leaves to finish their season's work.

Lifting Gladioli

The food stored in the gladiolus corm consists mainly of carbohydrates (sugar and/or starch), which are manufactured in the green leaves and passed down to the corms toward the end of the growing season for storage. If the leaves are cut off or die before their task is completed, the corms will be small and the food reserves may

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not be sufficient to produce a first-class spike of flowers the following season. This is not perhaps so important where gladioli are given good cultural conditions in the garden as it would be to plants growing wild in desperate competition with many others. Nevertheless, it is a good general principle in growing plants with bulbs or corms to allow the leaves to die before detaching them.

It is not wise to lift most bulbous garden plants until the leaves have completely died down, but gladioli are an exception to this rule probably because their roots normally die some time before the leaves. Moreover, gladiolus corms lift in better condition if dug as soon as the leaves show a marked change in colour, usually about six weeks after the flowers have faded, and many of the cormlets will become detached and be left in the ground if lifting is done too late. This causes great confusion in subsequent years where an effort is being made to keep named varieties separate.

Gladiolus species are often left in the ground for several years without being lifted, but the garden varieties rapidly deteriorate if not lifted every season.

Drying Off in Autumn

Lifted plants are best spread out in a thin layer in shallow boxes or trays, using a separate tray for each variety to catch any cormlets which may fall off. Alternatively, the plants can be hung up in a shed in bunches and left until the leaves are dead, although many cormlets fall off and become mixed if this is done.

Some growers make a practice of cutting off the leaves an inch or two above the corms as they are lifted instead of leaving the leaves to die first. The latter method is preferred, although more troublesome, as the corms get the benefit of any food materials left in the dying leaves.

It may be several weeks before the corms are dry enough to be put away. It is said to be best to do the initial drying in a shady place, and not put the corms out into the full sun until they are almost dry.

When the outer skins ("husks") of the corms are crisp, the foliage dead, and the corms quite dry cut off each stem about ½in. above the new corm, break off the shrivelled old corm, which should now snap off cleanly, and put the corms and cormlets away for the winter.

Corms which are obviously diseased can be picked out at this time and destroyed, but the corms should not be skinned before being stored, as premature removal of the skin is said to cause the corms to shrivel during storage.

Storing

Store the corms in a cool, airy, dry, frost-proof shed. If stored in a moist place, the corms go mouldy, and if conditions are too warm, they may shrivel and start to sprout prematurely.

The corms are best stored in shallow boxes such as nurserymen use for growing bedding plants, and stacked so that ample air reaches all the corms. Smaller quantities may be stored in brown paper bags which have been punched with holes to allow circulation of air. On no account should corms be put away for months in more or less airtight, lidded tins or boxes.

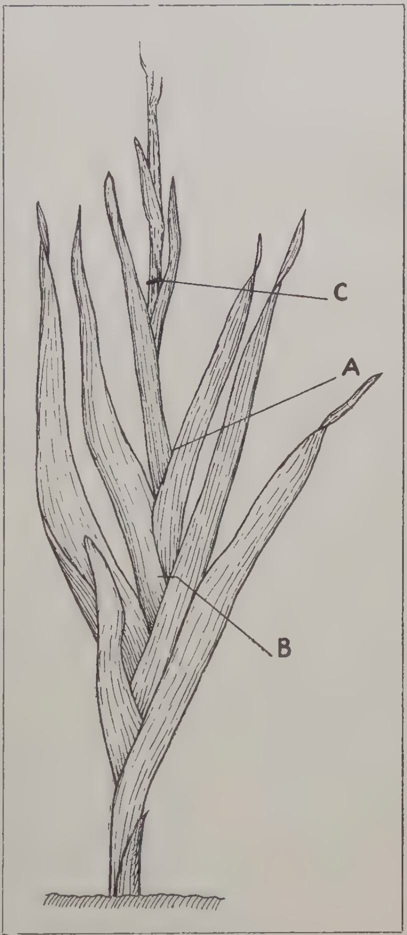

Fig. 6—When cutting flower spikes insert a narrow-bladed knife at (A), run it down along the side of the stem to (B), turn it sideways, and cut through the flower stem. Then withdraw the spike without tearing the leaves. This ensures a long-stemmed flower with minimum damage to the leaf system. If left to flower in the garden, each spike should be cut off at (C) when the last flower has faded, leaving all leaves intact.

Cutting the Flowers

Experiments have shown that cutting off the gladiolus flower spike has little effect on the weight of corms produced, provided no leaves are removed with the spike, although the size of the new corms will be materially affected if any leaves are removed or damaged.

To cut a spike of flowers slide the knife down alongside the stem to the point at which the stem is to be cut, cut through the stem with a sideways twist of the knife without cutting the leaf more than necessary, and withdraw the flower spike, leaving all leaves substantially uninjured to complete their task (Fig. 6).

A few plants of a variety with vigorous leaves may be grown especially for the supply of foliage to go with the cut flowers.

Keeping Cut Gladioli

Spikes are usually cut for market in the evening or early morning, when the bottom two flowers are open. They are stood in buckets in a cool place, with water up to the flowers, left for a few hours, and boxed and sent to market. This "long cool drink" is considered to have a marked effect on the subsequent quality of the flowers.

American workers have queried the wisdom of this traditional practice. [Tinckner, M.A.H., "The Care of Cut Flowers," the Journal of the Royal Horticultural Society, 1942, Vol. 67, pp. 373-380.] Plants usually keep best if cut in the evening or early morning, when they contain the maximum amount of moisture, but experiments in the United States seem to show that gladioli last better if they are cut at 2 p.m., when they contain less moisture, and are left lying in the sun for about 20 minutes to "soften" before being taken into the house and put in water or, in the case of commercial growers, packed for market. It will be interesting for home gardeners to try out this suggestion, but it is urged that growers, in conjunction with florists, should satisfy themselves by trial that the treatment is advantageous under New Zealand conditions before treating substantial consignments of cut gladioli in this way.

The gladiolus makes a superb cut flower, with a far longer life in water than most garden flowers. If cut when the bottom two or three flowers are opening, it can often be kept fresh in the house until the last bud at the top of the spike has opened, provided the stem is shortened by an inch or two every few days, the water changed, and the withered flowers taken off.

The giant classes of gladioli are too large for use in decorating most homes, where the smaller, more graceful varieties and species are much more suitable.

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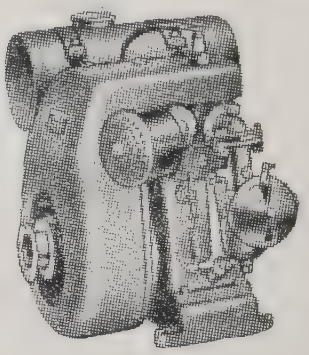

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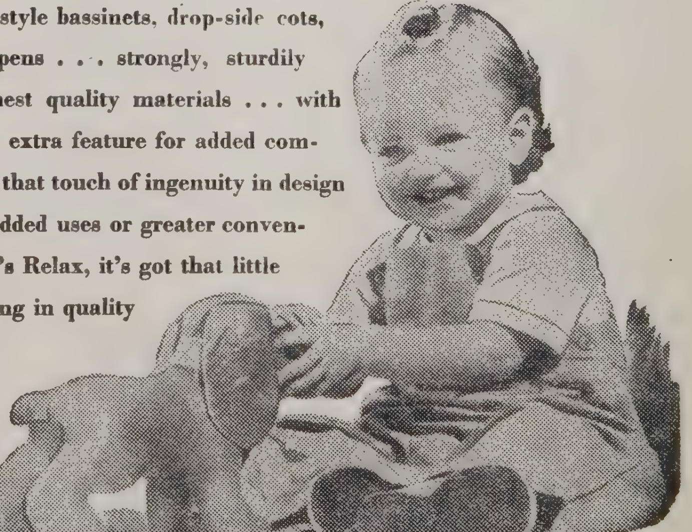

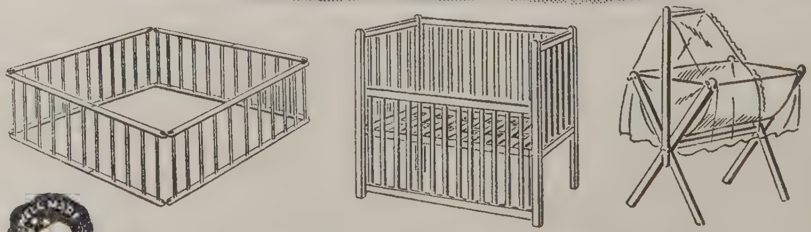

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NF5

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Show Work

This article is concerned mainly with growing gladioli for garden display to add colour and interest to the border through the summer months. No particular mention is made of growing or preparing flowers for show work. Anyone interested in this specialised work will find many useful hints in "The New Zealand Gladiolus Year Book for 1947" (price 5s. 6d. from any bookseller) and in other New Zealand gardening publications. The newcomer will be astonished at some of the "tricks" practised by experienced exhibitors to produce perfect blooms on the date of the show.

For show purposes gladioli are classified in New Zealand into the following groups:

1. Giant formal or exhibition with flowers more than 5½in. in diameter when shown.
2. Medium formal or exhibition with flowers 3¼ to 5½in.
3. Small formal or exhibition with flowers less than 3¼in.
4. Giant informal or decorative with flowers more than 5½in.
5. Medium informal or decorative with flowers 3¼ to 5½in.
6. Small informal or decorative with flowers less than 3¼in.

Varieties

There is sometimes said to be a dearth of good, strong, self-coloured gladioli and too many pastel and multi-coloured ones. This trend of gladiolus development over the last few years has not met universal approval, as many home gardeners prefer the brighter colours, but there is now such a wide range of good varieties of all types that it should not be hard for anyone to find the types he prefers.

Another criticism of present-day developments is that breeders seem to pay more attention to producing varieties suitable for show than for garden display. This is understandable, as show enthusiasts are prepared to pay much higher prices for corms of novelties than home gardeners, who want a good effect in the garden without minding too much what varieties contribute to the display.

The specification of a good show variety is quite different from that of a variety suitable for garden display. The show variety is required to make its maximum display on one particular day, but the garden gladiolus should spread its quota of colour over as prolonged a period as possible.

Although the show fancier may pay the highest prices for a single corm, the home gardeners, with their aggregate demands for corms by the million, are the mainstay of the gladiolus trade, and their needs for garden types should be borne in mind by gladiolus breeders and raisers.

There are thousands of varieties in a wide range of colours and types. No attempt can be made to give a list of the best varieties for garden use, as so much depends on the gardener's taste for colours, form, and other characteristics. For example, some prefer clear, self-coloured varieties, and others have a strong preference for varieties with flecked petals.

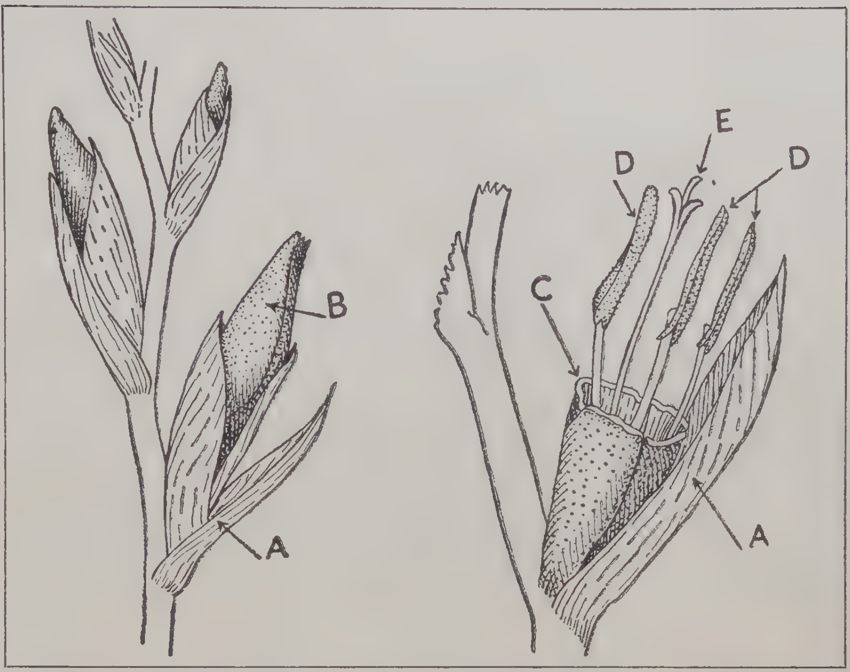


Fig. 7—To cross-pollinate gladioli select flowers which are just showing coloured petals (B) but where the petals have not started to unfurl. Cut off petals and the tips of the green parts (C) and remove the three anthers (D), but leave the three-forked stigma (E). Cover with a paper bag for a few days, when the stigma (E) will be ready to receive pollen from another flower.

Picardy is a well-known pink variety which must, however, be mentioned. It is not new, but is unsurpassed for the home gardener. It makes a first-class cut flower, is fine in the garden, and can also be grown for exhibition, being prominent at nearly every gladiolus show.

Varieties of the *G. primulinus* types are much shorter and more delicate than the grandiflorus and primulinus hybrids, but have a special charm and value as cut flowers for decorating the home.

NEW VARIETIES

New varieties of plants are produced either vegetatively or by seed. Vegetative propagation, which is carried out by means of cuttings, layers, budding or grafting, division, or by the production of new corms and cormlets in the case of gladioli, normally produces plants which are exactly similar to their parents. That is both the strength and the weakness of vegetative propagation, as it can usually be relied on to produce offspring of known type, but cannot as a rule be used to produce new varieties.

Occasionally, however, a vegetative bud will develop characters different from the plant on which it has grown. This "break" or "bud sport," which can be propagated vegetatively to produce a new race of plants, may have defects which make it worthless, but on the other hand it may be an improvement on its parent and may be worth propagating as a new variety.

A corm or cormlet of gladiolus saved from a known variety may produce a flower which is different from, and even an improvement on, its parent. A watch should be kept for such sports, which may become important new varieties if the new character reappears in all the offspring (corms and cormlets) saved from the original. If the offspring does not show the new character, it may be considered that the first departure from the original was due to some temporary cultural accident and, of course, no new variety has been produced.

Raising New Varieties from Seed

Unfortunately, gladioli do not produce bud sports as often as some plants, such as chrysanthemums. The normal methods of raising new varieties of gladioli, as with most other plants, is by means of seed.

A seed is formed by the union of two parts, the male pollen grain and the female ovule, each of which contributes about half the hereditary

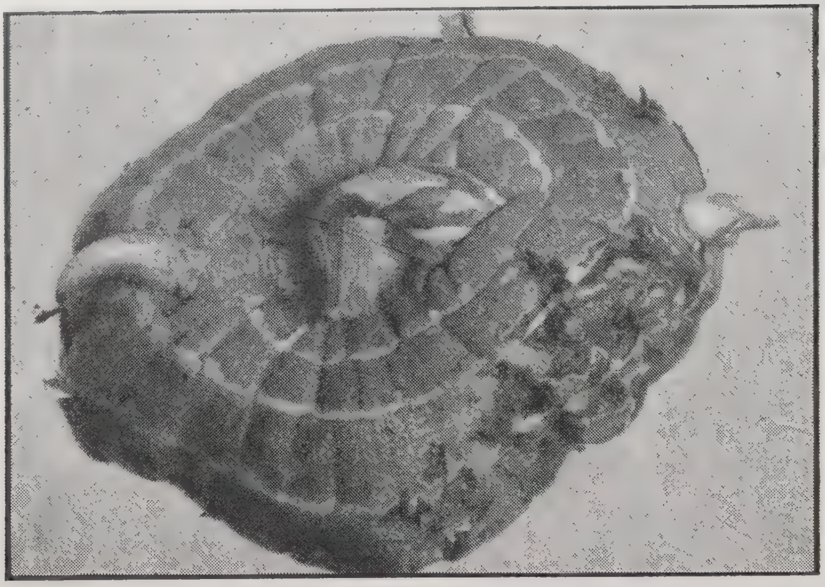


Fig. 8—Gladiolus corm affected by hard rot, showing the sunken, irregular lesions.

characters which decide the "personality" of the offspring. The vast number of possible combinations of characters make seedlings of modern hybrid gladioli most variable even if an ovule has been fertilised by pollen from the same flower, and pollen from a flower of another variety introduces even greater possibilities of variation.

The great majority of seedlings show no improvement on their parents, but are usually much inferior to them in some respect or other. Occasionally, however, a plant raised from seed may prove to be a great improvement on its parents or on any other known varieties.

The cormlets and corms of this seedling should then be carefully saved and grown on in the following years until a stock has been built up. If the succeeding generations of flowers continue to live up to their early promise and do not develop any serious faults, the new variety may be given a name and put into commerce, where it may even make an international reputation for its raiser.

The skilled plant breeder chooses his parent plants most carefully, yet the chance of a really first-class new variety being produced is not very great unless he raises thousands of seedlings, most of which will be discarded. The chance of a worthwhile new variety turning up from haphazard saving of seed is even more remote.

How to Start Raising

Anyone who intends to raise gladioli from seed in the hope of producing a new variety would probably save himself much trouble by first reading "Practical Plant Breeding," by W. J. C. Lawrence, published by Allen and Unwin at about 9s. 9d.

The 1946 and 1947 issues of "The New Zealand Gladiolus Year Book" contain many articles both of a reminiscent and technical nature on the raising of new varieties of gladioli and other subjects.

To raise new varieties the amateur should start with a few corms of first-class varieties, and grow and stake them well. As the flowers show colour but before they start to open (see Fig. 7) carefully pull the petals off, emasculate the flowers by plucking the anthers out with tweezers, and cover the spike with paper bags to prevent visiting insects from bringing unwanted pollen from other flowers.

Two or three days later select ripe anthers dusty with pollen from the flowers selected as male parents, and gently dab the pollen on to the central stigmas of the emasculated flowers. Cover these again with their bags for a few days longer, then remove the bags and wait for the seed pods to swell, collecting them just before they ripen to avoid loss of the seeds.

Growing Seedlings

Where seedlings are grown out of doors the first important rogueing is made in the third growing season, resulting in the discarding of all but the most promising plants. By sowing seeds in a heated glasshouse as soon as they are ripe many seedlings can be flowered in less than a year, which enables the initial rogueing to be made earlier.

Collect the seed pods as soon as they show signs of splitting, lay on a sunny window sill for a day or two, and separate the seeds from the pods as soon as they shake out readily. Sow at once in boxes of good soil, covering the seeds with ¼in. of soil, and water them in. Cover the boxes with sheets of brown paper to prevent the soil from drying out, but remove the paper as soon as the seedlings appear, and give sufficient heat to keep the young plants growing until they have two leaves, after which they should be gradually dried off by withholding water.

Seeds sown in March and grown in a heated glasshouse should be ready to be dried off by the end of July. Each seedling will have produced one small corm, which can be planted out in the early spring and treated as a normal cormlet.

Many of these seedling cormlets may flower in this first season after planting, although the plants will not necessarily show their true character in the first flowers and rogueing requires considerable judgment.

Seed sown in boxes in a cold glasshouse in early spring and transplanted out of doors later, or seed sown direct into the open ground late in September will not normally flower in the first year, although a very occasional plant may do so. Corms produced from these sowings should be lifted in the late summer, when the foliage changes colour, dried, stored, and planted in the usual way the following season, when most of them should flower.

Early Gladioli Under Glass

The gladiolus is a flower popular with florists and is grown under glass in large quantities overseas to provide the market with early flowers. It has been found that very early plantings are often not a success because the corms will not grow. Various ways have been devised to "break the dormancy" of the corms by giving them chemical or heat treatment which makes them start to grow when planted.

Gladiolus Colvillei, The Bride (white), *G. nanus*, Peach Blossom (pink), *G. byzantinus* (purple red), and several primulinus hybrids are among the most popular types overseas for growing under glass. Little of this early forcing work is done in New Zealand.

DISEASES AND PESTS

Given adequate care, gladioli grow well and give ample satisfaction in the garden, but the gardener should be on the look-out for several common troubles.

The common gladiolus diseases and pests are usually carried over from one season to the next in the dormant corms, although infection from the soil can also occur in some cases. It is therefore of utmost importance that the gardener should pay strict attention to the following hygienic rules:

1. Never plant in land where gladioli were diseased the previous year.
2. Never plant a diseased corm on any land, especially if the area has not been used for gladioli for some years and is therefore likely to be free of gladioli diseases.
3. Husk and inspect all corms before planting, discard all which have scars, scabs, lumps, or rotten places, and dip the apparently-healthy corms immediately before planting in the manner already described.
4. Carefully dig out and burn all plants which start to wilt or go yellow prematurely during the growing season. At the same time take out the soil around each corm and stem and carry it in a bucket, without spilling any, to a place where it can be burnt or deeply buried.
5. Never plant corms on which there are thrips, as they will multiply and spread rapidly through all the plants. Treat corms for thrips during the storage period.
6. Control thrips during the growing season.
7. Purchased corms should be scrupulously inspected and badly-diseased ones discarded. Slight infections should be cut out, and the corms dipped before planting.
8. Burn all husks, diseased foliage, discarded corms, and other gladiolus refuse.

Common Diseases of the Corms

Corms are commonly attacked by a number of diseases, generally having similar symptoms. Although several of the more important diseases are described in detail below, it is not necessary for a gardener to be able to distinguish between them, as they are all controlled in a similar way by following the general rules of hygiene.

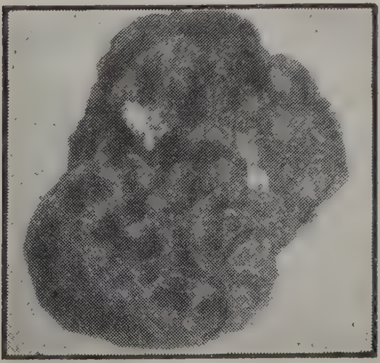


Fig 9—Corm showing the large, circular lesions with prominent concentric ridges caused by basal rot.

Scab or neck rot (*Bacterium marginatum*): Reddish-brown spots or stripes which later split and show burnt-out scabs appear on the leaves, often followed by a wet rot of the inner leaves just above the ground, causing plants to flag and topple over. Husks of infected corms become ragged and appear charred, and rounded, shallow, brown depressions, or large, irregular pits, surrounded by conspicuous, raised margins, occur in the flesh of the corm.

Hard rot (*Septoria gladioli*) causes minute brown or purple spots on the leaves. The centre of each spot later turns grey and may even fall out. Spores are washed by rain from infected areas on the leaves down into the soil where the corms are infected. Large, dark-brown or reddish-brown, sunken, irregular lesions are produced on the corms, which may even become hard and shrivelled. Corm infections cannot be seen until the corms are husked, and one of the main reasons why corms should be skinned before planting is to enable diseased corms to be thrown out before planting, as an infected corm contaminates the soil for several years.

Basal rot (*Fusarium* spp.): Affected plants sometimes turn yellow and die, but often the attack is confined to the corm in storage, when small reddish-brown spots on the corm may grow into large, circular lesions which are marked by prominent concentric ridges. If slightly-affected corms are planted, they produce only stunted plants which do not flower. This disease is carried over from season to season both in affected corms and in the soil where diseased plants grew in the previous season.

Mosaic is a virus disease of gladioli which may become serious, but about which little is known at present. It is wise to dig up and burn any plants which show light green mottling, especially on the young leaves, or abnormal breaking and flecking of flower colour, and also to burn any very small, abnormal, warty corms, as these are all symptoms of the virus, which cannot be cured and will affect all the progeny from an infected plant.

Common Pests

Thrips are by far the most serious pest of gladioli in New Zealand. These insects, which are not natives of this country, have slender, elongated bodies up to 1/10in. long when fully grown, and range in colour from yellow to brown or black. The insects run about actively on the flowers and foliage, often sheltering in the overlapping leaf sheaths; the fully-grown insects have wings and fly freely.

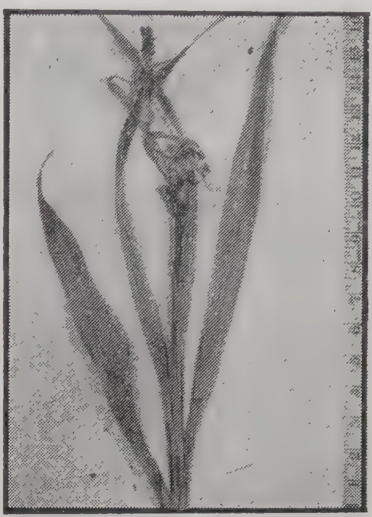


Fig. 10—A gladiolus plant completely ruined by thrip damage.

The insects, which also attack arum lilies, carnations, and other garden plants, puncture the leaves and petals to obtain the cell sap, on which they feed, and in doing so produce a characteristic silver or brown, scurfy appearance on the surface of the parts attacked. This scurfing, coupled with numerous minute specks of hardened excreta scattered over the surface, enables the trouble to be recognised at once, even though no thrips can at first be seen, but a search in the leaf sheaths and flowers of attacked plants will usually reveal them sheltering in large numbers.

If thrips feed on the flower buds, the buds may look "scorched," the petals may be unnaturally streaked, and, of course, the flowers are ruined.

A careful search for thrips should be made on developing leaves and flowers at frequent intervals during the growing season, or serious damage may have been caused before it is noticed.

Young thrips larvae are so delicate that if knocked off their host plant many of them will die before they can regain it. Heavy syringing or hosing with water two or three times a week will greatly reduce the pest by sweeping off young larvae, and this method is ideal for controlling thrips on small numbers of gladioli.

The traditional insecticidal treatment for thrips has been to use a nicotine and white oil spray. This is made up by dissolving 2oz. of soft soap in a little hot water, adding it and 1 fluid ounce of nicotine sulphate to 4 gallons of water, and then adding 2 fluid ounces of summer (white) oil emulsion.

A second application should always be made about 14 days after the first to destroy young thrips which have

CULTURE OF GLADIOLUS . . .

A spike of the gladiolus variety Corona.

hatched from eggs not killed by the first wash.

More recently D.D.T. has been reported as giving good results. This can be used as a 1 per cent. to 3 per cent. dust, preferably applied to the plants in the early morning, when they are wet with dew; if it is given at this time of day, one application is said to give more or less complete control. It is expected that suitable D.D.T. dusts may shortly be on the market. Liquid sprays of D.D.T. would no doubt be equally effective, but there is at present no suitable spray material on the market in New Zealand. D.D.T. oil sprays are not suitable, as they are liable to damage the gladiolus plants.

If, despite earlier treatment, leaves are still seriously infected with thrips at lifting time, it is wise to cut off the stem 1in. above each corm as it is lifted, collecting the leaves carefully in a box and burning them as soon as possible afterwards to destroy all the insects which they are harbouring. If infected plants are allowed to dry before the leaves are cut off, many of the thrips will have migrated to the corm by the time the leaves are dry.

Thrips are usually carried over from season to season on the corms, where they live and feed under the husks, causing brown, sticky staining on the flesh of the corm.

There are various methods of killing thrips on dormant gladiolus corms to ensure that the corms are not infested when planted. Dusting the corms liberally with naphthalene flakes at the rate of 1oz. of naphthalene to every 100 corms, leaving it in contact with the dormant corms for three to four weeks, and removing it before the corms shoot is said to give good control. Some growers treat corms in a sealed container with formalin by putting a few layers of blotting paper in the bottom of a biscuit tin and placing a wire cake tray over the blotting paper to prevent corms from coming into contact with it. The blotting paper is then soaked with commercial formalin, the tin filled with corms, and the lid sealed down for 48 hours, by which time all the thrips should have been killed.

Reports from America show that D.D.T. dust is effective in killing thrips on stored corms. A 5 per cent. dust has been used at the rate of 1oz. of powder to each bushel of corms, which are well shaken with the powder in a box or bag to ensure that a proportion of dust adheres to each corm.

Stem eelworm (*Anguillulina dipsaci*) is a general pest which is found on gladioli as well as many other garden plants, especially flowering bulbs. It is not usually a serious trouble in gladioli.

Potato aphis (*Macrosiphum gei*) occurs on gladioli, but is not usually a serious pest. An attack could always be controlled by early spraying with a nicotine wash, but this is rarely necessary.

"Blindness": Gladioli require a certain amount of light to develop a flower. Bulbs planted in dense shade, or under glass in autumn in the hope that they will flower in the winter, often produce no flower spike at all, not because of any disease or pest, but simply because there is insufficient light.

Acknowledgment

Thanks are expressed to the Director, Plant Diseases Division, Department of Scientific and Industrial Research, for supplying information regarding diseases and pests.

Reference

"Diseases of Bulbs," by W. C. Moore, Bulletin 117 of the British Ministry of Agriculture.

Photograph in the heading by Sparrow Industrial Pictures Ltd.

"A DEDICATION"

I SHOULD like to quote the whole of Adam Lindsay Gordon's beautiful poem, "A Dedication," but this, the concluding stanza, embraces the thought lying behind each verse, as the pageantry of the seasons is portrayed:—

"In the spring, when the wattle-gold trembles
'Twixt shadow and shine,
When each dew-laden air-draught resembles
A long draught of wine,
When the skyline's blue burnished resistance
Makes deeper the dreamiest distance,
Some song in all hearts hath existence;
Such songs have been mine."

What a vision the poet presents to us! When spring touches our countryside with awakening fingers our thoughts are centred on the beauty of surroundings; we feel the urge to advance, to put the best into life and to reap full measure. Daily chores take colour, simple pleasures become keen joys; we are pervaded by an atmosphere of well-being and a desire to spread happiness and peace. Blue and gold and green vistas, enhanced by distance, leafing trees and singing birds inspire us to a song of praise in appreciation of the Great Artist's handiwork and the joy of living.

Surely we shall each of us say, when the blithe footsteps of life's springtime have given way to the quiet tread of Autumn,

"Such songs have been mine."

—**"Njiniwa," Victoria, Australia.**

A USEFUL BOOKLET

TO meet a need of the public for information concerning existing cultural, recreational, educational, and social facilities in the Auckland Province, the Adult Education Centre (Auckland University College) has published a booklet entitled "At Your Service." Completely indexed and arranged for ease of reference, the booklet sets out the aims, addresses, and telephone numbers of 443 organisations, which are dealt with under such headings as Living and Working Conditions, Cultural Interests, Societies and Hobby Groups, Musical and Dramatic Societies, Overseas Interests, War Services, Welfare Organisations, Women's Interests, Youth Organisations, and Sporting. The price of the booklet is 2s.

THE GOOD NEIGHBOUR

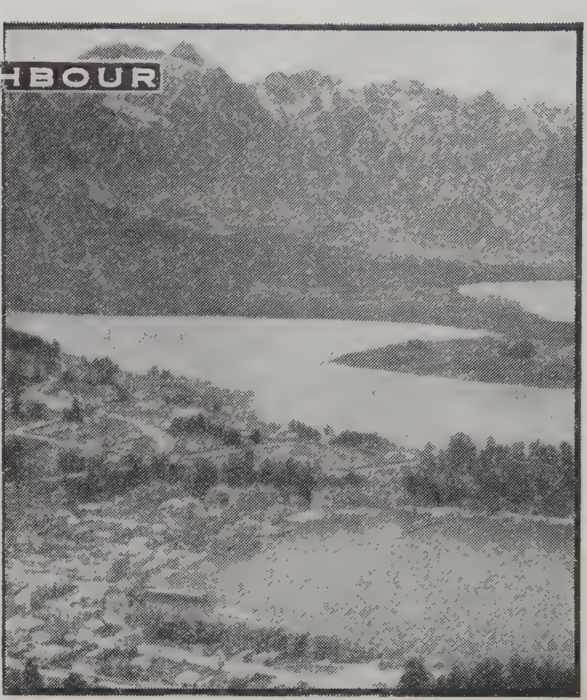
SOUTHERN SCENE

I SHOULD have been writing letters. I had finished one and was half-way through another when the flow of my thoughts halted, and glancing up, I became sharply aware of the azure loveliness of the sky and the cerulean blue of the lake where the peaks of mighty mountains reflected a Wedgwood pattern on the water. A little, warm wind from the pinewoods tugged at the curtains as if beckoning me forth. I glanced at the pile of mail in front of me, then my gaze lingered on the gulls gathered along a slender ledge of shore like drifts of cloud. If I went walking now I could be back in time to tackle a few more letters before tea, and surely it behoved me to make the most of the brief hours of sunshine. Thus reasoning, I paused only long enough to put on a shady hat and went out into the brilliant sunshine.

I started off along a street I had seen from my window. Tucked away behind a tumbledown facade was quite the most fascinating shop in the town, though apparently it was not open for trade. It was piled with knots of driftwood in divers sizes and shapes, most of them attractively grained and polished, and all of them fanciful in form. Some looked like birds; several had the appearance of human heads, viewed from the rear; and others branched gracefully as a deer's antlers. One pale golden piece had been modelled into the face of a child with smooth, suntanned cheeks and a singularly sweet expression, while a darkly curving root nearby exactly resembled a crocodile. As I pressed closer to the dusty panes to inspect the handle of a walking stick fashioned in the form of a duck's head, I perceived a heart of highly-polished wood among the dingy oil paintings on the far wall. Whether it had been intended as a Valentine or whether it was merely an artistic sample of mahogany-shaded timber I do not know, but it supplied a delightful touch of romance to the dusty little shop whose white-haired owner, habitually garbed in black and with his back bent as if in search of the picturesque pieces of driftwood he collects with a connoisseur's skill, could be observed down by the lake just before dusk each evening feeding the birds.

It was fun to wander first in one direction, then another, following at length a white ribbon of road that wound upward past modern bungalows and old-fashioned cottages surrounded by neatly-trimmed hedges of hawthorn and holly, till presently the houses were left behind and a signpost indicated that the real hill lay ahead.

Flowering stems of yarrow, virginal white or clover pink, formed a bridal pageant among the grasses, and golden stars of St. John's wort lighted the way through thorny thickets of tumatukuru. The road had long since narrowed into a track which in places was so heaped with stones that I found it easier to straddle the banks and proceed crabwise rather than try to maintain my balance on what at some time or other seemed to have been the bed of a watercourse. Spiders with their silky webs had made fairy lanterns of the brier tips, similarly festooning the manukas, many of whose capsules were the same deep wine tinge as the tapering stems of the makomako seedlings which were so plentiful here. Further up the hill, where the hot sun released the aromatic scent of the bluegums and the pine needles prickled underfoot, I noticed a cluster of ferns, the first I had seen during my walk. There were other clumps, too, growing in a cool grotto near rocks of unusually beautiful colouring, some being a dull green with veinings of copper, others like marble mottled with slate-grey and rose. A solitary bird sang overhead, but I could not glimpse the singer, the tree tops reaching to such a height that they swayed and creaked in the wind like a ship at sea.



[*National Publicity Studios photo.*

A bog swallowed the path just before the next bend and I was grateful for the stepping stones which nature had so conveniently provided. As the trees thinned I came out on to a grassy plateau where sheep grazed peacefully until they became aware of my presence, whereupon they plunged wildly down the hillside. The track had become a thin grey thread strung between brier rose bushes bearing bud and blossom and ripening berry all at the same time, and I was now so high that I could see the sinister brown shadows of the rock shoals beneath the water at the entrance to the bay, and the vessels at their anchorage looked no bigger than the boats children sail in the bathtub, and the town itself, with its roofs of red and green and occasional orange, resembled a set of dolls' houses.

As the timber line receded the terrain grew more rugged, great outcrops of stone scarring the steep slopes. The weather, also, had changed, as if in sympathy with the wilder nature of the country—the sun had gone and the sky was the greyish hue of the lichens clinging to the stones. I attempted once to climb a peak by way of a short cut, but the wind buffeted me against the boulders and I was glad to regain the orthodox route, although it was so slippery in parts that I had to watch my foothold. Nevertheless I was not too preoccupied to miss enjoying the beauty of the small growths among the tussocks—cushiony scabweed; dwarf hebe; the dainty snowberry whose sweet-tasting fruits were sometimes white, sometimes rosy pink; and the ivory-belled gentian, seemingly too fragile to be flowering in that desolate place.

From the shelter of an isolated tree beside the track I had a perfect view of the peninsula (where Maori relics are reputed to have been found) and a portion of the lake arm beyond, and if I had gone on right to the summit, I would have looked out over two lesser lakes, and the Kawarau and Shotover Rivers, scene of so much gold mining in the early days. . . . But the clouds were massing over the mountains, and the wind held a menacing sound as it roared round the crags, and even now my descent would be a race against the swift-gathering storm.

Mary

TREE TOMATO CHUTNEY 28/5/47
TREE TOMATO CHUTNEY 28/5/47
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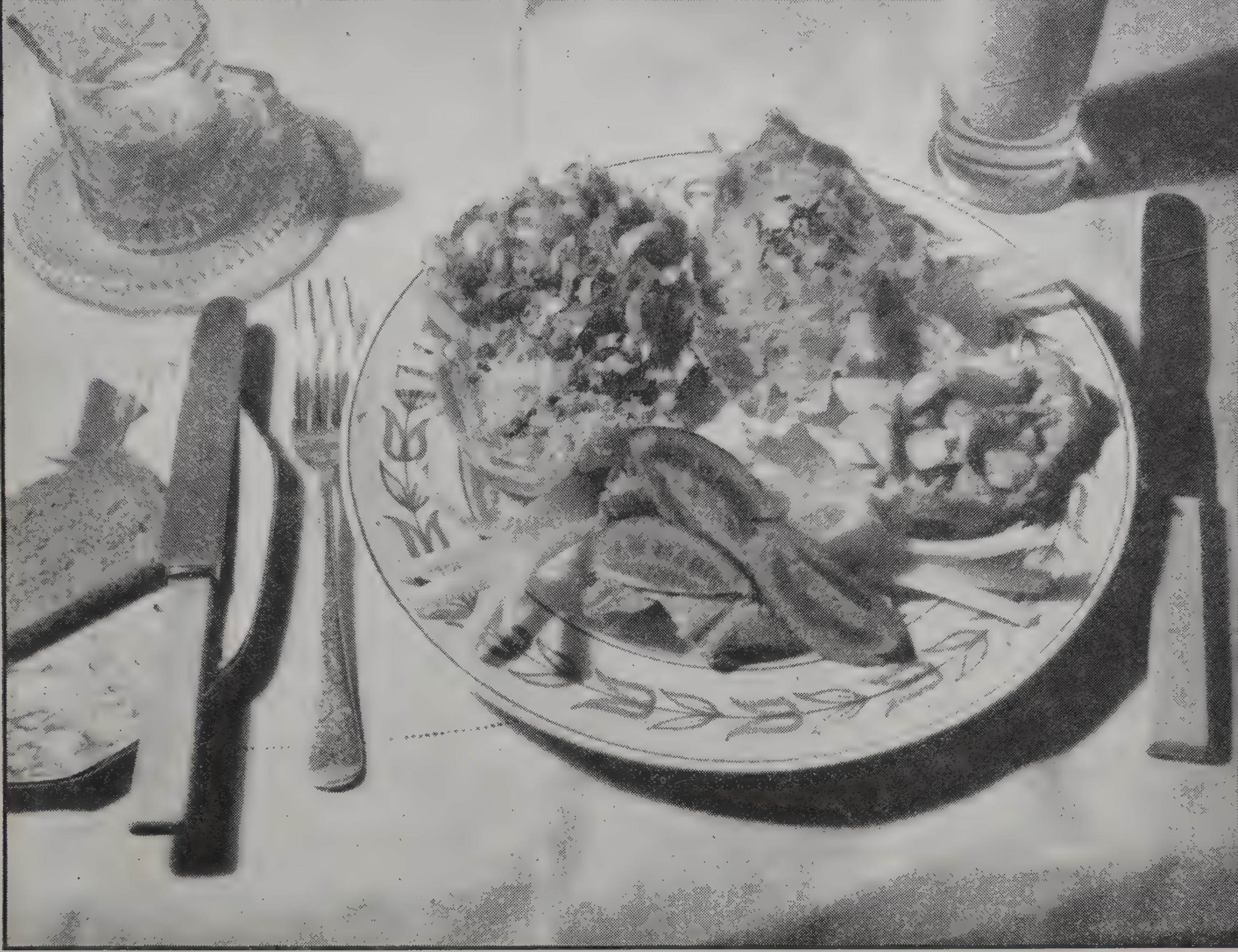

VARIETY IN TREE TOMATO RECIPES

By EVA TOPPING, *Rural Sociologist, Auckland.*

THE tree tomato is a versatile fruit, for it can be used in salads and savoury dishes, as a vegetable, and is delicious for desserts. As it comes into season when tomatoes and most summer fruits are finished, it is assured of a double welcome. It makes a jam of excellent flavour and pleasing bright red colour, while as chutney it is probably the best of all the relishes. A taste for tree tomatoes sometimes has to be acquired, but the fruit gains in popularity every season. The skin is tough and unpalatable and is not served but may easily be removed by pouring boiling water over the fruit and leaving it to stand for a few minutes before peeling, starting from the stem end.

Salads

The addition of tree tomatoes will lend colour and variety to winter bowl or plate salads. The red and yellow fruits can both be used, though the milder-flavoured yellow tree tomato is often more acceptable than the red when eaten raw.

Salad in a Bowl

For a salad in a bowl use shredded lettuce, endive, or young cabbage heart, well seasoned with chopped chives and parsley. Skin four tree tomatoes (more if desired), cut into thin slices crosswise, and mix the smaller ones through the green salad in the bowl. Arrange the larger slices in a ring on top at the outer edge of the bowl, leave a space of green, and make an inner ring of chopped hard-boiled egg whites or small sprigs of cooked cauliflower. Again leave a band of green showing, and fill the centre with diced, cooked beetroot.

Plate Salad

For an individual plate salad tree tomatoes can be used as a garnish or as an ingredient of lettuce cups. In the Winter Sunshine salad illustrated above three lettuce leaves are filled with grated carrot, grated cheese, and quartered yellow tree tomatoes. The fourth is filled with chopped apple and the fifth with shredded lettuce flavoured with "a suspicion" of grated onion. Chopped parsley and chives are sprinkled over the cheese and carrot, and the plate is garnished with curled celery sticks. Served with brown bread and butter and milk or hot milky coffee, this salad makes an acceptable and health-giving lunch.

Sandwiches

Sliced thinly and seasoned with salt and pepper the tree tomato is gaining great favour as a savoury sandwich filling for snacks. The yellow fruit is more favoured for sandwiches because of its milder flavour and also because the seeds of the red variety stain through the bread. As children often prefer sweetened sandwiches, the fruit can be sprinkled with brown sugar, or the bread and butter can be lightly smeared with honey.

Savoury Dishes

For many dishes tree tomatoes are used in place of tomatoes. They are of course not so moist and so more water, stock, or gravy is required. With pork, sausages, bacon, and other fatty foods, tree tomatoes give the necessary sharp-flavoured contrast. Skin and slice 6 tree tomatoes and put into a saucepan with 1 tablespoon of dripping, bacon fat, or butter, 1 teaspoon of sugar, 1 small onion chopped small, salt and pepper, and a little stock, gravy, or water. Stew gently until the tree tomatoes soften, and thicken with 1 dessertspoon of flour or ½ dessertspoon of cornflour mixed smooth with water or stock. These savoury stewed tree tomatoes can be served with meat dishes or on toast for breakfast or lunch. With bacon or other fried foods tree tomatoes can be skinned, cut in thick slices, and fried. For use with grilled chops or steak, cut the tomatoes in halves lengthwise, coat with seasoned flour, and grill in the pan with the meat. For other made dishes such as macaroni cheese, meat shapes, curries, and reheated minced meat hashes and stews the inclusion of tree tomatoes gives added zest and interest. Skin, slice, and add according to taste.

Cold Desserts

Since tree tomatoes come into season when other fruit is not plentiful, they make a healthful contribution to fruit salads. Make a syrup of honey, golden syrup, and water in equal quantities. Bring to the boil, cool, and add the juice of 1 lemon to 1½ to 2 cups of syrup. Skin and slice the tree tomatoes and add to sliced bananas, passion fruit pulp, chopped sweet apples, pears, or any other fresh fruit in season. Put the prepared fruit into a serving dish and pour the cooled syrup over it; set aside for several hours before serving with cream, thin boiled custard, or junket.

Stewed Tree Tomatoes

Stewed tree tomatoes and a cereal make an excellent breakfast dish and fill an awkward gap after tomatoes and summer fruits are finished and before the beginning of the citrus fruit season. Skin and stew the tree tomatoes whole in medium syrup of 1 part sugar to 2 parts water, cooking gently so that the fruit does not burst. Red tree tomatoes may require slightly more sweetening. Honey or golden syrup can be used in place of part of the sugar if desired.

Fruit Whip with Tree Tomatoes

2 cups tree-tomato pulp
2 egg whites
½ cup sugar
1 teaspoon lemon juice

The pulp may be cooked or used raw according to taste. Mash with the back of a wooden spoon, add the sugar, and cook gently until tender. Beat the egg whites until stiff, add the fruit mixture when cold, and the lemon juice. Pile in individual dishes and serve with boiled custard made with the yolks of eggs.

Tree Tomatoes in Jelly

Stew 6 to 8 tree tomatoes gently, drain, and put into a serving dish. Make 1 pint of lemon jelly, using the fruit juice in place of some of the water. Pour over the fruit, leave to set, and serve with junket or custard.

Hot Sweet Dishes

For a deep or shallow pie tree tomatoes and apples are delicious. Use 2 tree tomatoes to 1 medium-sized cooking apple. Pour boiling water over the tomatoes and skin and cut them lengthwise into quarters or eighths. Peel, core, and slice the apples, and mix the two fruits in layers in a pie plate or dish, strewing each layer with sugar. If the apples are a dry variety, add very little water. Cover with short crust and decorate with leaves or designs cut from the pastry trimmings. Bake in a hot oven until the pastry has risen and set, reduce the heat, and cook until the fruit is tender. Red tree tomatoes give the cooked fruit a pretty deep pink colour.

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Tree tomato and apple, or a mixture of tree tomato, apple, and quince make a good centre for steamed puddings or a base for baked fruit sponge pudding.

Preserves

Jam made wholly from tree tomatoes is a most attractive bright red and has a distinctive flavour, while with pie melon it is very useful for giving flavour and colour. Here are recipes for both the jams, and also for a deliciously-piquant chutney.

Tree Tomato Jam

3lb. tree tomatoes
3lb. sugar
2 pints water
2 lemons

Boil the water and pour it over the tree tomatoes; after 3 to 5 minutes skin the fruit. Cut up the fruit and put it into the preserving pan, covering with the water. Pare the rind of one lemon very thinly and cut into fine shreds. Take the pulp from both lemons, remove the pips, cut up, and add to the tree tomatoes. Bring to the boil and continue cooking for about half an hour or until the fruit is quite tender. Add the warmed sugar and boil until setting point is reached, take from the heat, and skim off any scum. Leave to cool 5 to 10 minutes, stir gently, and pour into clean warmed jars.

Tree Tomato and Pie Melon Jam

4lb. prepared pie melon
3 lemons
6lb. sugar
2lb. tree tomatoes
2 pints water

Boil the water and pour it over the tree tomatoes, letting them stand before skinning and cutting them up. Put the pie melon cut into dice in the preserving pan with the tree tomatoes and pour on the same water. Bring gently to the boil and continue cooking about three-quarters of an hour until the melon is tender and clear. Add the sugar (warmed) and stir continually until it is dissolved, then boil fast, adding the juice of the lemons just before setting point is reached. Test and pour into jars.

Tree tomato sandwiches.

Tree tomato and apple pie.

Chutney

2 doz. tree tomatoes
1lb. onions
2 dessertspoons salt
1 to 2 teaspoons cayenne pepper
½lb. raisins or sultanas if raisins are not available
1lb. green apples
2lb. brown sugar
2-4 teaspoons mixed pickling spices (chillies, peppercorns, cloves, and allspice)
1 pint vinegar

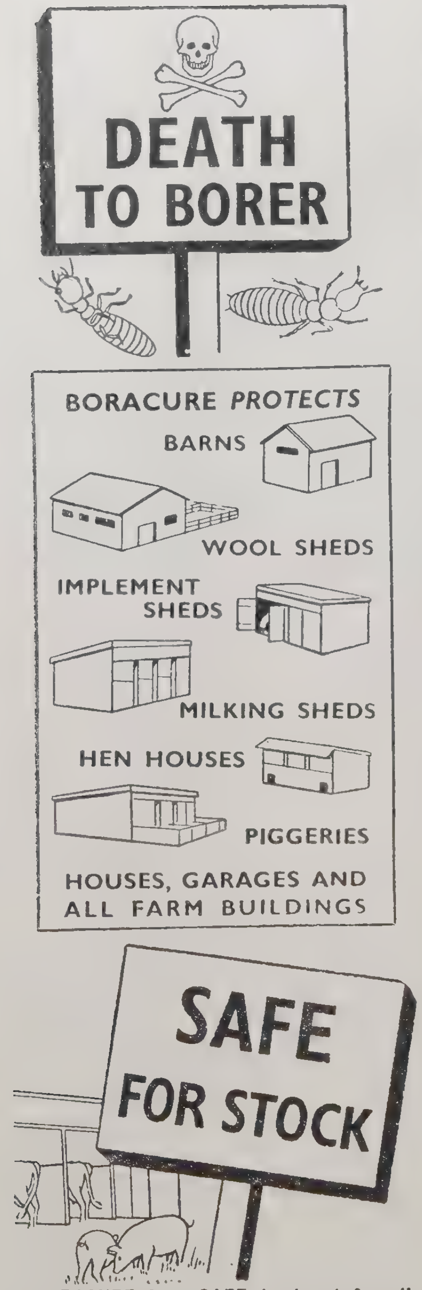
Scald and skin the tree tomatoes, cut into small pieces, and put into a large saucepan. Add the apples (pared, cored, and cut small), chopped onions, and all the other ingredients. Tie the spices in a piece of muslin so that they can be easily removed. Bring to the boil and continue cooking gently (stirring occasionally to prevent sticking) until the fruit is quite soft and the mixture is a rich brown and thickened. Cooking may take 1½ to 2 hours. Pour into sterilised jars, cover with a layer of melted wax, and tie down.

The quantity of pepper and spices can be varied to suit the individual taste. Sultanas can be used, though the chutney loses in flavour when raisins are not available.

Bottled Tree Tomatoes

The yellow variety of tree tomato is usually preferred for preserving. The fruit is skinned and either quartered or left whole, whole fruit giving a more attractive appearance to the finished product. Make a medium syrup, using 1 cup of sugar to 2 cups of water. Stew the whole fruit gently until well cooked but not broken. Pour into warmed sterilised jars, while boiling hot, and seal immediately.

All photographs in this article by Sparrow Industrial Pictures Ltd.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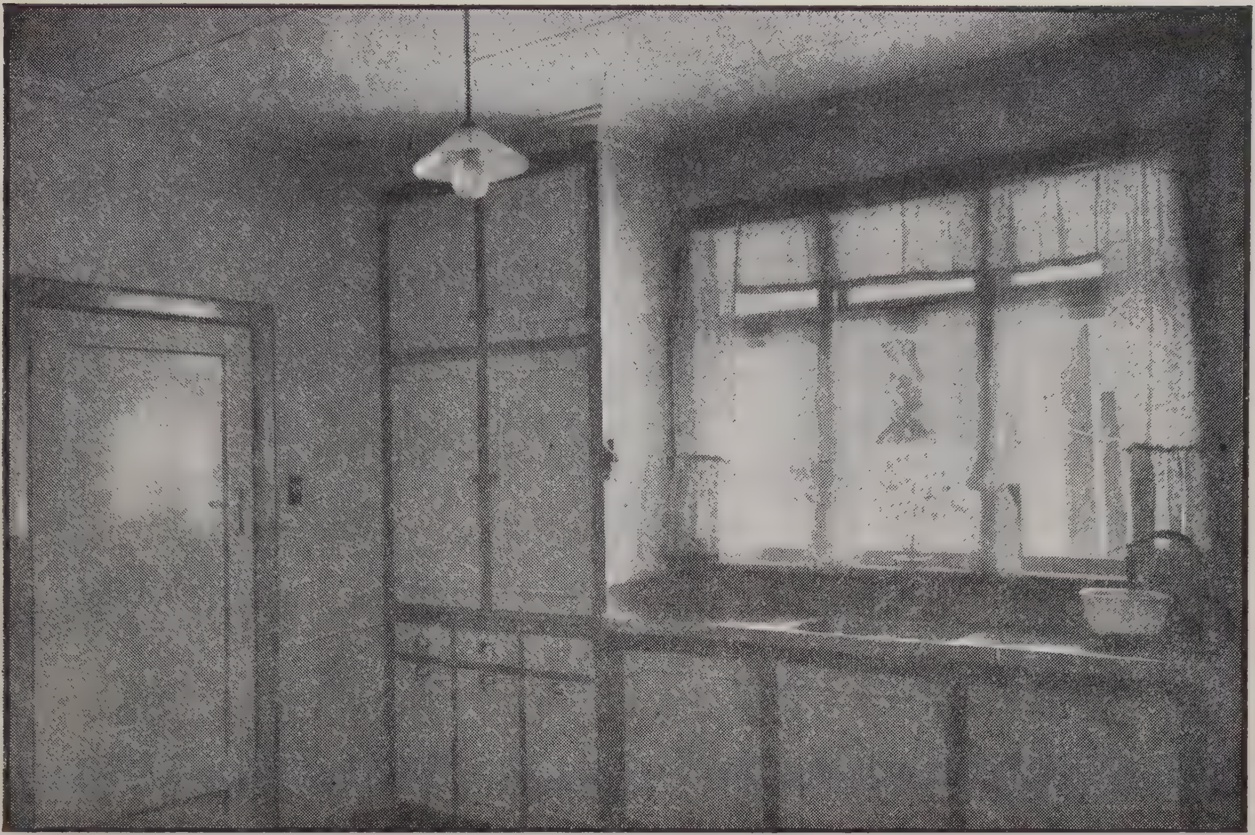

THE FUNCTIONS OF A KITCHEN

By **NORMA K. METSON**, *Rural Sociologist, Wellington.*

OLD friends need no introduction, but sometimes when they appear in a different hairstyle or a new "creation" recognising them is quite difficult. Features long familiar assume new aspects, and they must be analysed in an attempt to find just what has made the change. So it is with kitchens. Many have become so much a part of those who live and work in them—and two-thirds of the housewife's working time is spent in the kitchen—that they are accepted unthinkingly. An electric stove is bought—but it goes into the gap left by the removal of the coal range. New cupboards are built—but the dishes and supplies are transferred to exactly the same relative positions as they occupied in the old pantry. Linoleum is laid on the floor—and scrubbed with the same vigour and frequency as were expended on the bare boards.

THE labour of kitchen work is greatly reduced when the movements required for any routine job such as cutting lunches or making scones have become habitual, but there are bad habits as well as good ones. In her own home the housewife may be able to find anything on the shelves in the dark, but could someone else? A good way to check up on a room is to notice its effect on a stranger.

If a visitor who has offered to dry dishes or prepare vegetables is able to find her way about without continual cries of "Where does this go?" or "Where do you keep that?" there is reason to feel satisfied with the logic of the arrangements.

Existing doors, windows, and plumbing may make improvements to a kitchen difficult, but much can be done by re-arrangement without large expenditure on new equipment or building materials. The kitchen is the room which is most nearly standardised in basic plan and furnishings. A big family needs larger storage space, equipment, and meal table, but the processes involved in cooking and cleaning up do not vary much for households of normal size.

Working Efficiency

Kitchen work has been studied by methods which have been used for greater efficiency in industry—methods which aim to reduce to a minimum the number of steps taken, tools used, and movements for certain work. No very exact adjustments are possible or necessary; there has been much scornful and justified laughter over split-second calculations and slow-motion photographs of the "one best way" to scrape a carrot, but the principle remains valid. Intelligent planning does reduce fatigue and frustration by cutting down the distances travelled and the handling of equipment required in the day's work.

A general rule of modern planning is that rooms must be fitted to function. What, then, are the functions allocated to the average farm kitchen—one which is something less

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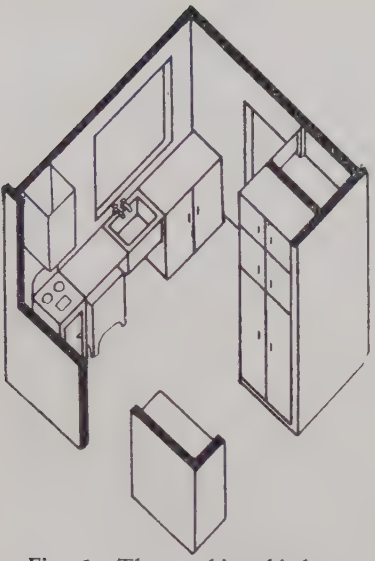


Fig. 1—The working kitchen.

than the all-purpose room used for everything but sleeping, and more than a streamlined laboratory for handling food? Almost always the kitchen is used for the preparation, cooking, and preservation of food, dish washing, storage of equipment and supplies needed for those tasks, and small children's play. It is used frequently for serving and eating all meals or possibly only for breakfast. Clothes are rarely washed in the kitchen, but sorting, ironing, and airing are usually done there. Casual visitors are entertained and children do their homework. Cleaning equipment is stored. More rarely, quantities of farm products are handled—for example, buttermaking or eggs for market. Dressmaking is done. There is a desk for household or farm accounts, and the telephone.

To discuss the kitchen in isolation from the rest of the house is indeed difficult; it becomes the catch-all for every job for which no provision has been made elsewhere. In addition, the presence of the housewife and the warmth of the range make it the social centre of the house for a good part of the day.

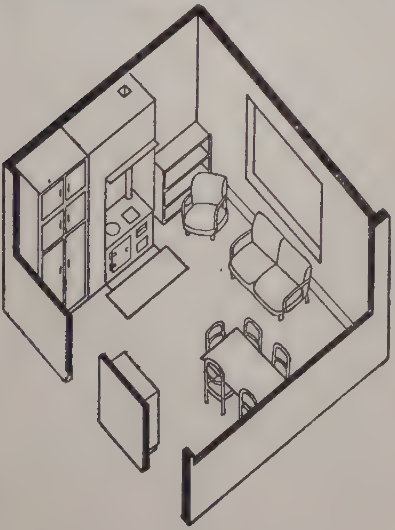


Fig. 2—The living kitchen.

Types of Kitchens

Recent English publications classify three types of kitchens: The working kitchen, the living kitchen, and the dining kitchen.

The working kitchen (Fig. 1) is a domestic workshop containing all the large equipment. That includes the sink and stove for food preparation, the washing machine and tub for laundry work, but no extra space for living. Cupboards provide storage for food and smaller equipment, and meals are served in an adjacent dining-living room. This idea can be considered for a small adult family, but is not practicable when cooking and washing are large-scale operations. In the minimum example illustrated the large-sized sink also serves as a tub, and the washing machine or boiler is beneath the bench at the left.

The dining and living kitchens are each associated with a utility room.

In the living kitchen (Fig. 2) the "kitchen" is limited to the stove and some storage cupboards. The stove in this case is usually a fuel one which heats the room, and most of the space is taken up by the dining table and sufficient comfortable furniture to make a pleasant room in which to sit. The utility room is then a combination of scullery and laundry with the sink, most of the cupboards, and the laundry facilities. In a small house there may be no other living room. This arrangement saves on total space, but entails much walking back and forth between stove and sink.

The dining kitchen (Fig. 3), with work space at one end and the meal table a central feature, is more usual in New Zealand. It can be adapted for either a fuel or an electric stove and allows the laundry to be reduced to a minimum size or enlarged to include additional work and storage space.

A further step in evolution from this (Fig. 4), the kitchen divided by a partition of cupboards into working space and dining area, is well adapted to New Zealand conditions. This partition provides extra storage room and sufficient separation of working and eating, but, because it does not extend right up to the roof or right across the floor, the cramping effect of two small rooms is avoided. A large house permits still further differentiation of function and may have a separate dining room of considerable size.

The type of fuel used for cooking and water heating is of primary importance in kitchen planning. In New Zealand electricity is usually available and electrical equipment is preferred. With electricity separate fixtures are required for room heating, water heating, and clothes drying. All these are efficient and allow flexibility in planning, but the economy of the fuel stove, which provides so much in one piece of equipment, is the chief argument in its favour. Recent shortages of electricity and the possibility of breakdowns in remote areas are further points against the all-electric establishment. Electric water heating may be arranged from a central cistern, but in an old house with widespread plumbing small separate installations may be better. Small fuel boilers which combine the heating of space and water may be used alone or as a supplement to an electric system.

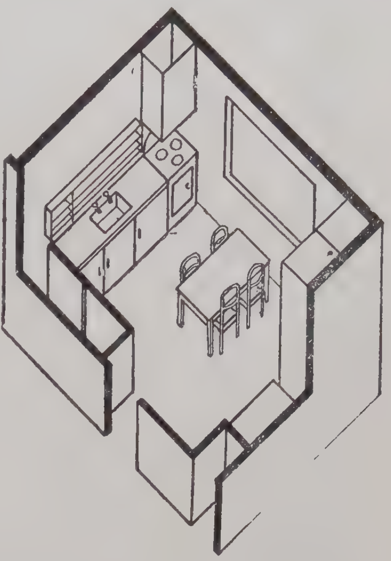


Fig. 3—The dining kitchen.

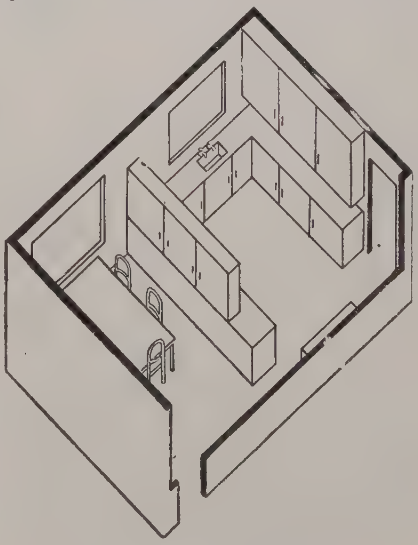


Fig. 4—The divided kitchen.

THE FUNCTIONS OF A KITCHEN

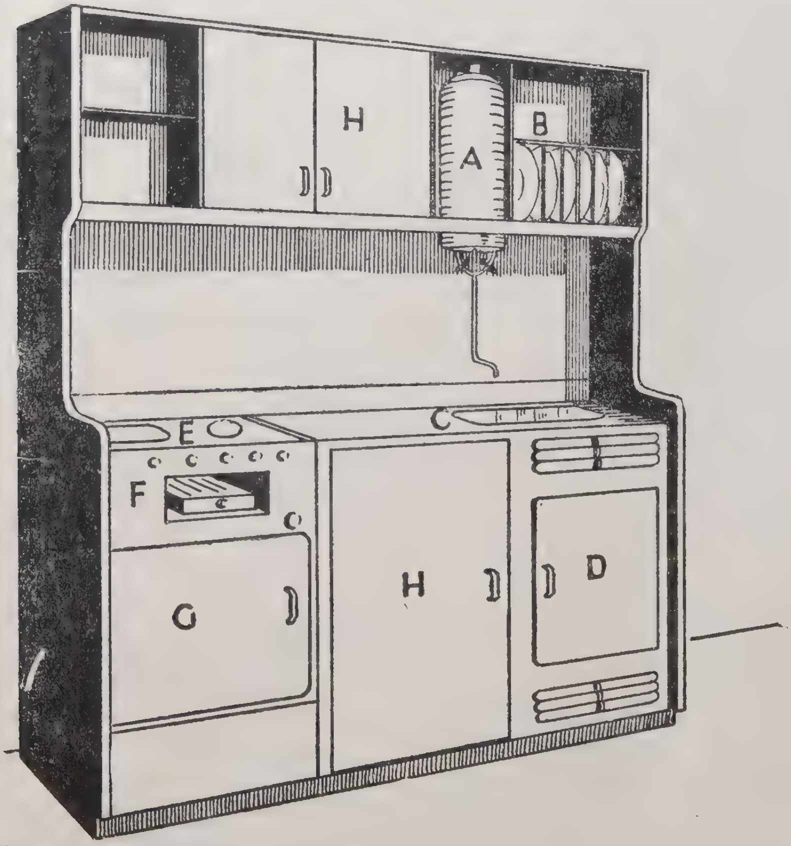
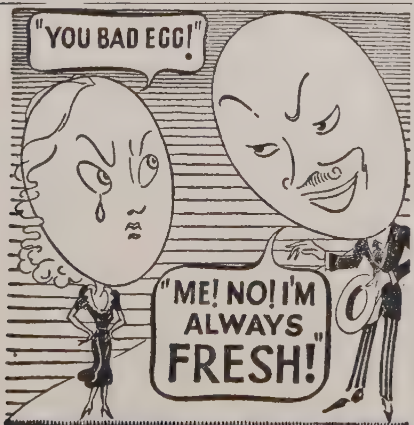


Fig. 5—The "package" kitchen. A, water heater; B, plate rack; C, sink; D, refrigerator; E, stove top; F, grill; G, oven; H, storage cupboards.

Meals in the Kitchen?

The decision for or against dining in the kitchen will be made after considering some of these points:—

The size of house and household are basic.



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Kitchen dining simplifies the service of meals and reduces the distance food and dishes must be carried.

In a small house a separate dining room is not possible, and the kitchen may be preferred to the living room for every-day meals.

The kitchen meal table provides a useful large work surface for such tasks as ironing and baking in quantity.

The larger kitchen has a spacious air and there is more room for children.

Preparing a meal causes unavoidable untidiness and a smell of cooking, even in a well-ventilated room, which will detract from the pleasure of eating.

With a stove in operation the room will become very hot in summer.

If the kitchen table is in use for other purposes, it is annoying to have to clear it off at mealtimes.

People waiting for the meal to be served may hinder the housewife.

If there are guests, it is sometimes inconvenient to have no place but the kitchen in which to serve meals; a porch, dining alcove, part of the living room, or some other place out of the kitchen where meals can be served if desired without requiring a separate dining room is very convenient.

Assembly Line Planning

Modern kitchen planning is based on the assembly line principle; that is equipment is placed so that the worker moves naturally from one place to another in the sequence of work and is not continually crossing and recrossing the room. Major pieces of equipment have a work centre built around them so that practically everything needed by anyone working there is within reach. Storage is planned so that items are clearly visible and readily accessible without unnecessary stooping, stretching, and lifting.

A work area unbroken by doors is highly desirable. More than three doors in a kitchen, unless they are all at one end, create traffic problems, to say nothing of draughts. However, direct access to the front and back of the house is necessary. Two outside walls, if possible, will allow windows for cross-ventilation and plenty of sun and light. There should be a ventilating hood over the stove, and an electric fan above the window is an effective supplement if natural ventilation proves inadequate.

The "Package" Kitchen

Minimum equipment can be fitted into a very small amount of clear wall space. The so-called "package" kitchen (Fig. 5) incorporates a sink, stove, refrigerator, water heater, and some storage space in a unit 5ft. 6in. long, 1ft. 9in. deep, and 6ft. 9in. high. Increasing the length to 7ft. 6in. gives more room for storage in tall or divided cupboards.

Another English suggestion, designed for mass production in units which can be fitted together, comprises electric refrigerator; electric hot plate, grill and oven; water heater; broom cupboard with a heating element beneath the floor so that it can be converted to a drying cabinet; ironing board folding into a cupboard with storage space; and further cupboards for food storage and utensils. Sink and drainboards are required in addition. The whole unit takes 11ft. of wall space, but individual pieces can be arranged in different positions. Construction is of anodised aluminium with vitreous enamel working surfaces.

Standardised units of that type are most useful. The space needed for a complete set is known and can be provided on the plan, and the minimum units can be bought at first and added to later without creating a patchwork effect or problems of connecting different types and levels of surface.

A survey of these general considerations in dividing up the service areas of a house must precede more detailed discussion of equipment and storage units.

THE MANAGEMENT OF POT PLANTS

COMPARATIVELY few New Zealand homes are graced by well-grown pot plants. J. P. Hudson, Horticulturist, Wellington, has written some notes on growing plants indoors to round off the articles in the July and August issues on raising young plants at home.

IN some countries overseas, especially on the Continent of Europe, a wide range of pot plants is grown to decorate the home. Nearly every windowsill is graced by a well-grown plant with colourful flowers or attractive foliage. The householder finds an interest and satisfaction in growing his indoor plants, while the appearance of the houses from outside is enhanced by the effect of the plants seen through each window.

Rarely indeed are well-grown pot plants found in a New Zealand home. In a recent house-to-house survey in Wellington more than 94 per cent. of the homes had no pot plant of any sort growing indoors. One house in 20 had pot plants, but most of them were in such poor condition that they had no value at all as decorative plants. About one per cent. of the householders had a real interest in pot plants, but few even of these could show well-grown and really-decorative plants.

It seems that, as a nation, New Zealand prefers net curtains to pot plants as window dressings in homes. Can that be the result of past failures through inadequate knowledge of the art of growing pot plants?

Any householder can grow a wide range of pot plants cheaply and well if attention is paid to the details of their cultivation. In the past two issues of the "Journal" articles have appeared on the preparation of compost for growing pot plants and on the raising of pot plants from seed. This month the story is completed with a few hints on the management of pot plants in the house.

Watering

Growing plants require a constant supply of moisture but do not appreciate a waterlogged soil. A properly-constituted potting compost will hold moisture yet will drain freely, but some discrimination is still required in watering pot plants.

The vital rule is to water a plant only when it needs it. Far more pot plants are spoiled by over-watering than by not being watered enough.

The best way to find out whether a pot requires watering is to tap it with a bone knife handle. A dull, thudding sound indicates that the soil is in close contact with the wall of the pot and is still damp. No water should therefore be given, as too frequent and unnecessary watering can soon cause the soil to lose its desirable, well-aerated condition.

If the soil is beginning to dry out, it will draw slightly away from the side of the pot, which will give a ringing note when tapped. That is an indication that it is time to water. Pour water gently into the pot until it is full to the brim, filling the ½in. space left for this purpose above the soil level. This volume of water will ensure that all the soil in the pot is moistened; any surplus will run through the drainage hole.

It is essential to fill the pot every time it is watered. If watering consists only of putting a few drops on the surface each day, the topsoil soon becomes sodden and compacted, while the soil lower down in the pot may dry out altogether and never be rewetted. No plant can be expected to grow well under those conditions.

Occasionally a pot may accidentally be allowed to become very dry, when the ball of soil will draw right away from the pot. If water is applied, most of it will run down this crack and drain away instead of percolating through the soil. In such a case the pot should be moistened, left for an hour or two for the soil to swell and close up to the pot, and then rewatered, being filled carefully to the brim. The second volume of water should soak into the ball of soil.

Long-lived house plants, such as palms and aspidistra, which have been growing for a long time, perhaps years, in the same receptacle should occasionally be stood in deep water for a few hours, with the pot completely immersed, to ensure that the ball of soil and roots is completely wetted.

Watering is best done with a jug with a good spout or one of the small watering cans sold specially for the purpose. These enable water to be poured gently on to the soil without splashing or dripping and without washing the soil into hollows.

It is not possible to say how often pot plants should be watered, as much depends on the time of year and the condition of the plants. In hot, dry weather moisture evaporates more quickly from both pot and soil than when conditions are cool and damp, and strongly-growing plants will take far more water from the soil than plants which are growing only slowly.

As a general rule, however, pot plants should be looked at, and most of them watered, daily in the summer; it may be sufficient in winter to tap the pots twice a week and water only those which make the ringing noise.

Drainage

If the soil in a pot seems to remain very wet after being watered, inspect the drainage hole in the bottom of the pot to make sure that it has not become blocked. Soil will wash down into the hole and choke it if the pot was not properly prepared with a broken crock over the hole and a layer of rough material over the crock, as described last month.

A worm in a pot will often cause the drainage hole to become blocked. If a worm cast is seen on the surface of the soil, the plant should be knocked out of the pot, the compost gently worked away from the roots until the worm is found, and the plant then repotted. There should not, of course, be worms in compost which has been made from sterilised ingredients.

Feeding

A well-balanced potting compost should provide the plant with all the food it needs for some weeks (a month or more in larger pots), but after that plants should be fed every 10 to 14 days as long as they are growing strongly. That is especially necessary if the lower leaves start to look rather pale, which is often a sign of shortage of nitrogen.

One way of feeding pot plants is to hang a sack of animal manure in a barrel of water, leave it a few days, and then use the liquid for watering after diluting it to the colour of weak tea.

Alternatively, pot plants can be fed with a complete "artificial" fertiliser. Home gardeners who wish to mix their own are recommended to use 6 parts of sulphate of ammonia, 3 parts of superphosphate, and 1 part of muriate of potash, or sulphate of potash when obtainable. This should be mixed with about its own bulk of dry sand or dry, sieved soil, and at each application the mixture should be used at the rate of ½ teaspoonful for each plant in 5 or 6in. pots or 1 teaspoonful for each plant in pots over 6in. in size.

Aeration

Even the best potting compost tends to cake on the surface after a time, preventing the free passage of air into and out of the soil. The top of the soil should be scratched over with a nail every few weeks to leave a loose, friable surface.

Plants which form a large root system will naturally take up more room in the pot as they grow, and the ball of soil will swell. If the surface rises nearer than within ½in. of the rim, or 1in. in pots larger than 6in., a little soil should be removed when the surface is scraped to maintain the correct level for proper watering, or, alternatively, the plant should be potted on into a larger size.

Plants on the Windowsill

Plants tend to grow toward the light, so plants growing indoors should be turned every few days through a half circle to prevent them from growing lop-sided and unshapely.

Leaves which grow into contact with the glass of a window often turn yellow and die prematurely. Pot plants should be stood far enough in from the window to prevent that from happening, but in most New Zealand homes the windowsills are too narrow for growing good pot plants. That is another indication of national indifference to pot plants. In countries where pot plants are appreciated the windowsills are built 8 to 10in. wide to accommodate well-grown plants.

Dying leaves should be picked off as soon as they begin to turn yellow. A sharp watch should be kept for pests, particularly scales, greenfly, and caterpillars. Hand picking when any of these are first seen will usually suffice to keep the plants healthy.

Plants which are tender, such as balsams, should be stood as far in from the window pane as possible during the winter, as a touch of frost through the window will readily kill leaves in contact with the glass.

Purchase of Pot Plants

Householders may prefer to buy plants in flower rather than raise them themselves. Many of the plants offered in flower in pots can be grown on another year, and their initial cost can thus be offset against the pleasure they give in more than one season.

Unfortunately, some of the flowering plants offered for sale are raised in great heat to produce a plant quickly and are not properly hardened off before sale. Transport to market in a draughty lorry and exposure for sale in a cold shop give the plant a check from which it may be slow to recover, and that often accounts for the dropping of leaves or flower buds when the plant is first taken home by the buyer, who has then to nurse it back to health by careful treatment.

A few growers, too, sell plants in flower in pots which are too small and the soil of which has been practically exhausted by the time the plants are offered for sale. The home gardener can overcome this fault by potting on or feeding the plants, but the public might be more ready to buy pot plants if they were sold in more suitable condition to bloom reliably for a long time after the first flowering.

A well-grown pot plant, which will flower for months, is really cheaper than a bunch of flowers which will soon fade, but some of the pot plants sold in the past have been very disappointing to their buyers, and that may well partly account for the lack of public interest in this class of plant.

Choice of Plants

There is a wide choice of plants which will grow well in pots in the house. Among the easier to grow are:—

In the lightest places, such as sunny windows: Geraniums, pelargoniums, fuchsias, pots of spring- and summer-flowering bulbs, begonias, cacti, and balsam (*impatiens*).

Away from direct sunlight, such as in windows facing south: Fuchsias, pots of bulbs, begonias, cyclamen, coleus, and balsam (*impatiens*).

In dark positions, such as on tables inside rooms and away from the windows: Palms (kentias, etc.), aspidistra, asparagus "fern," maidenhair fern, dracaena, pandanus (screw pine), and *Hoya carnosa*.

Dahlia propagation should now be in full swing. Home gardeners can increase their stocks of this favourite flower in several ways, described in the "Journal" for March, 1947.

Garden Work for October

Annuals sown outdoors last month should now have germinated and be growing strongly. As soon as the seedlings can be distinguished from weeds (and it is useful for gardeners to learn to recognise very young plants) they should be thinned out, first to about 2in. apart each way and again, later in the season, to a final spacing of 6 to 8in.

Plants growing too thickly will soon starve each other. Nature induces starved plants to flower prematurely and so ensure survival of the race by seeding. Having fulfilled this function of seeding the plants die, which may be efficient from Nature's point of view but does not help to keep the garden bright with flowers through the summer.

Bedding plants may still be planted out from boxes. The box should be watered a few hours before to make sure that the plants are fully charged with water (turgid) when planted, and also that they can be lifted from the boxes with less damage to their roots than is caused by lifting them from a dry soil. Even with this precaution a great deal of root damage is bound to occur when the plants, especially the first to be taken from each box, are separated from each other. The damage can be minimised by first removing one side from the box and then cutting between the plants, and lifting them out, with a triangular, flat-bladed trowel such as plasterers use. In general, bedding plants should be set out about 8 to 10in. apart each way, and each should be planted to about the same depth in the bed as it was growing in the soil of the box. If the plants are showing flower, the flower spikes should be cut off to ensure that well-branched plants are produced instead of their energy being dissipated in premature flowering. That is especially important with nemesias and petunias, which are prone to flower too soon and exhaust themselves.

Begonia cuttings, rooted in a glasshouse, should now be potted singly into 3in. pots, using John Innes potting compost.

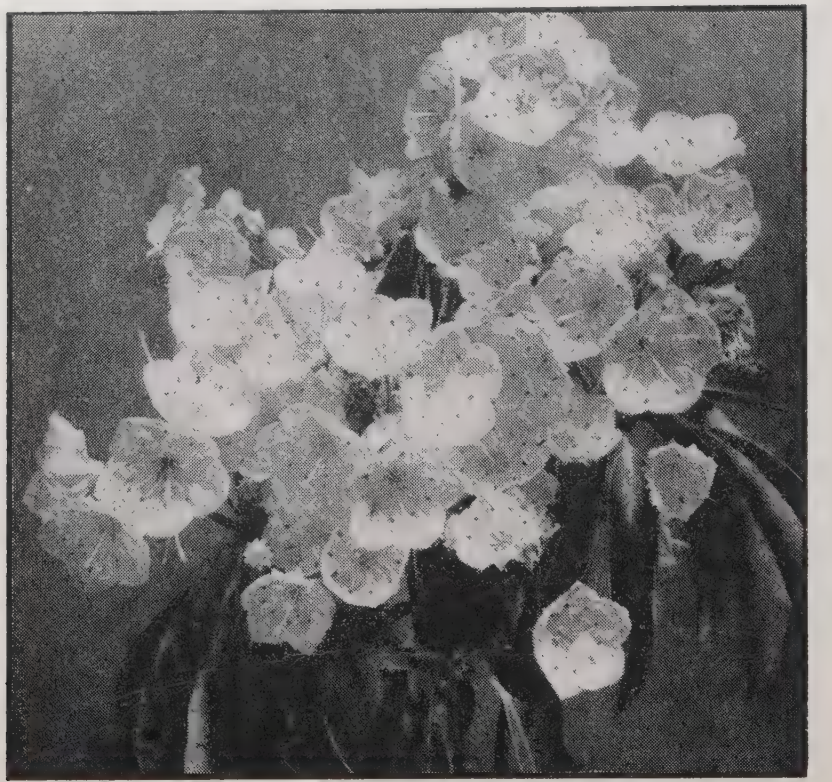
Chrysanthemum cuttings rooted in frames should be hardened off preparatory to being planted out. About 10 days before they are planted out the top should be nipped off each plant on which side shoots have not already started to grow. Well-rooted plants can be set out in the milder districts, spacing them about 15in. apart each way, but it is better to delay planting until November in areas subject to severe late frosts. Clumps of chrysanthemums left in the border from last year should be thinned out as soon as the growths are an inch or two high, removing from each clump all but two or three of the strongest shoots.

Chrysanthemums were used to produce an interesting late autumn effect in a garden in Wellington last season. A few surplus late-flowering chrysanthemum plants had been planted out in late October between dahlias, which were already making strong growth. The chrysanthemums each ran up to a single stem and were not stopped. They looked very drawn through the summer months, but they grew through the dahlias in early autumn just as the last dahlia flowers were fading. The chrysanthemums were not fine blooms, of course, but made a worth-while display of late colour and extended the season of the bed by about four weeks.

Dahlia tubers put into a warm place last month should now be producing new shoots. Several methods of propagation (described in detail in the "Journal" for March, 1947) are now open to the grower, who can take cuttings and root them in a glasshouse or frame, or divide the old roots. Ensure that any tuber selected for planting has at least one strong bud developing on its neck, as it is useless to plant tubers without buds. Divided tubers may now be planted out in frost-free districts, but elsewhere it is better to delay planting until November, when all likelihood of frost is past. Until then the tubers awaiting planting may be set out in a cold frame with the light removed except on frosty nights.

Fuchsias should be pruned if they have not been already. Cut out altogether shoots and branches which have died during the winter and thin, weak, and straggling shoots. The remaining healthy shoots should then be shortened, the strongest back to about 6in. and the weaker ones to about 1in. from their bases.

Geraniums will stand a certain amount of frost on their leaves, but



[*Douglas Elliott photo.*

The North American calico bush *(Kalmia latifolia)* is one of the most beautiful flowering shrubs, with pink flowers and handsome evergreen foliage. The bush is hardy, flowers in early summer, and requires an acid soil.

the roots are more tender and plants will die if the soil becomes frozen. In very cold districts, where plants were lifted in autumn and wintered in a frost-proof place, they should be planted out again as soon as the risk of heavy frosts is past. Plants should be cut back hard when planted to encourage them to form shapely bushes.

Gladiolus corms should continue to be planted out, as described last month.

Hardening off: Young plants that have been growing in a cool place will be unchecked by a degree of cold which would seriously injure plants brought out suddenly from a warm glasshouse. A check of this sort early in the life of a plant may interfere seriously with its later development, so bedding plants which have been grown under glass should be hardened off before being planted out. The hardening off process consists of making conditions more rigorous in a heated glasshouse, by gradually reducing the use of heat, and by leaving the ventilators open, first in the daytime and then at night. A few days later the plants can be moved to a cold frame, the light of which can be left off in the daytime and not fully closed down at night unless a frost is likely, until by the time the plants are required for setting out they have become quite accustomed to outdoor conditions.

Herbaceous plants which have been in position for a season or two often produce far more new shoots than are required. They should be thinned out as soon as practicable, all the weaker ones being removed first and the remainder finally thinned to a small number—two to six to each clump, depending on the nature of the plant. Each of the shoots will then develop a fine, shapely head of flowers. Wherever practicable the superfluous shoots should be removed at their point of origin from root or crown. If cut off at ground level, they often produce a number of spindly secondary shoots which must be removed later, making unnecessary work.

Lawns should receive their quarterly dressing of fertiliser, consisting of three parts of sulphate of ammonia, two parts of superphosphate (only one part on well-established lawns), and one part of sulphate of iron, applied evenly at the rate of 1oz. of the mixture to the square yard.

This quarterly dressing, based on some particularly valuable research work done by the staff of the Grasslands Division, Department of Scientific and Industrial Research, will lead to a gradual but continuous improvement in lawns under almost all soil conditions and in all parts of the Dominion by producing fertility conditions which will encourage the fine lawn grasses yet discourage many of the troublesome lawn weeds.

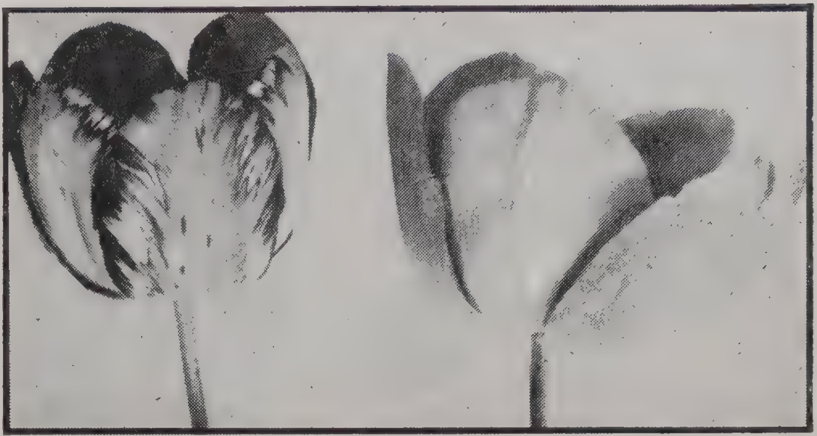
Sweet peas, allowed to grow naturally, will produce three flowers on most of the stems. For show work sweet peas are required with long, straight stems each bearing four or more flowers. These blooms are produced by reducing the number of flower stalks on each plant, which then produces fewer but finer flowers. The best way to reduce the number of flower stalks is to grow each plant on a single stem (cordon) by removing all side shoots as they appear. At the same time it is the custom to pinch off the tendrils and, as that removes the plant's natural supports, to tie each stem as it grows to a string or bamboo cane. Later, when the flower buds start to appear, the earliest are also pinched out until ultimately the plant produces buds which are of the size and quality required.

Trailing Plants: In the "Journal" for May, 1947, a number of trailing plants were recommended as suitable for clothing walls and banks in the milder districts. The one referred to as a "trailing *Mesembryanthemum* species, with fine leaves and masses of pretty pink daisy-like flowers from spring to autumn" is *Mesembryanthemum* (or, more correctly, *Drosanthemum*) *floribundum*. There is a dearth of hardy trailing plants which would clothe a wall or bank in districts which experience heavy frosts in winter. The Horticulture Division, Department of Agriculture, P.O. Box 3004, Wellington, would be interested to know of plants which readers in cold, frosty districts have used successfully for covering ugly banks by trailing them down from the top.

Tulips make beautiful cut flowers but tend to flop about in the vase, especially if they have been out of water for a few hours. The stems can be stiffened by cutting ½in. from the bottom of each, laying the flowers on a sheet of newspaper with the heads just clear of one edge, rolling them into a tight bundle so that the stems are perfectly straight, and putting them in deep water up to the flowers. Leave them for an hour or two and then unroll the bundle. The stems will have stiffened up considerably and the flowers can be arranged in a vase.

Violet plants produce by far the finest flowers in their first season. For that reason it is best to repropagate them each year in the early spring by lifting each clump, removing the rooted side growths, and discarding the old clump and the long straggling runners. The plants should be set out about 8in. apart each way after the digging over of the bed and the working in of a dressing of compost, leaf mould, or other form of humus, with 2oz. a square yard of the complete flower border fertiliser frequently referred to in these columns (three parts by weight of blood and bone, two parts of superphosphate, and one part of muriate of potash). They should be planted in a place sheltered from the fierce heat of the summer sun (which always induces red spider attack) and preferably in a fairly moist soil. The generous treatment recommended will build up large, strong clumps that should bear fine, long-stemmed flowers in the winter.

DISEASES IN THE FLOWER GARDEN



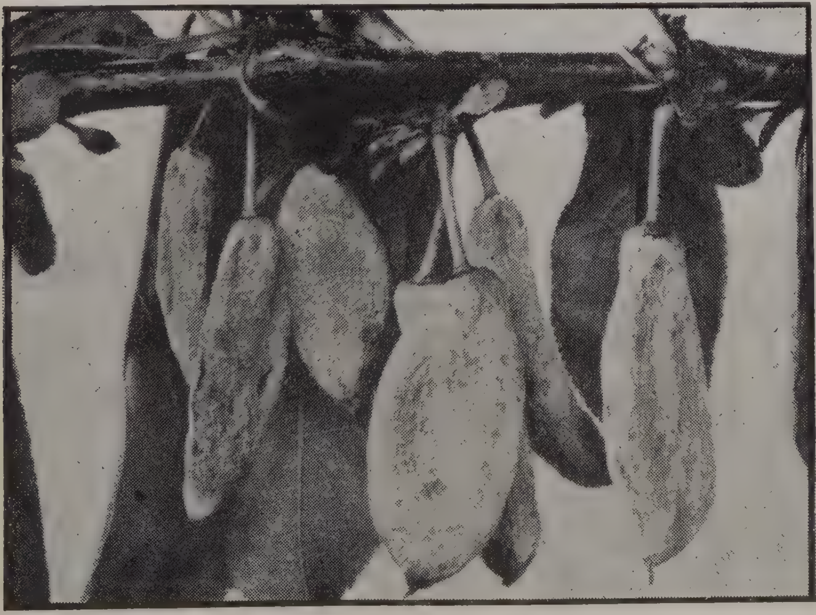
A normal tulip bloom (right) compared with one showing streaks of unnatural colour, caused by the "break" or "stripe" virus disease.

Reminders about Common Troubles

Bladder-plum is a disease caused by a fungus (*Taphrina pruni*) closely related to that which causes peach leaf curl. Japanese plums are more commonly infected than English varieties. Leaves may be blistered in much the same way as in peach leaf curl, but the most noticeable feature is the abnormal development of the fruits, which become elongated, distorted, spongy, and hollow. The fungus lives from year to year in the shoots, which appear lighter in colour than normal, swollen, and sometimes distorted and twisted.

In controlling the disease it is important that affected branches and shoots should be cut out and burnt, preferably as soon as the presence of distorted fruits makes the infected branches easier to see. Wounds should be painted over at once with bituminous paint.

Trees which were infected in the previous year should be sprayed with Bordeaux mixture as soon as the buds begin to swell in spring, as for peach leaf curl. A fuller account of this disease, by G. H. Cunningham, appeared on page 419 in the April, 1946, issue of the "Journal."



[*W. D. Reid photo.*

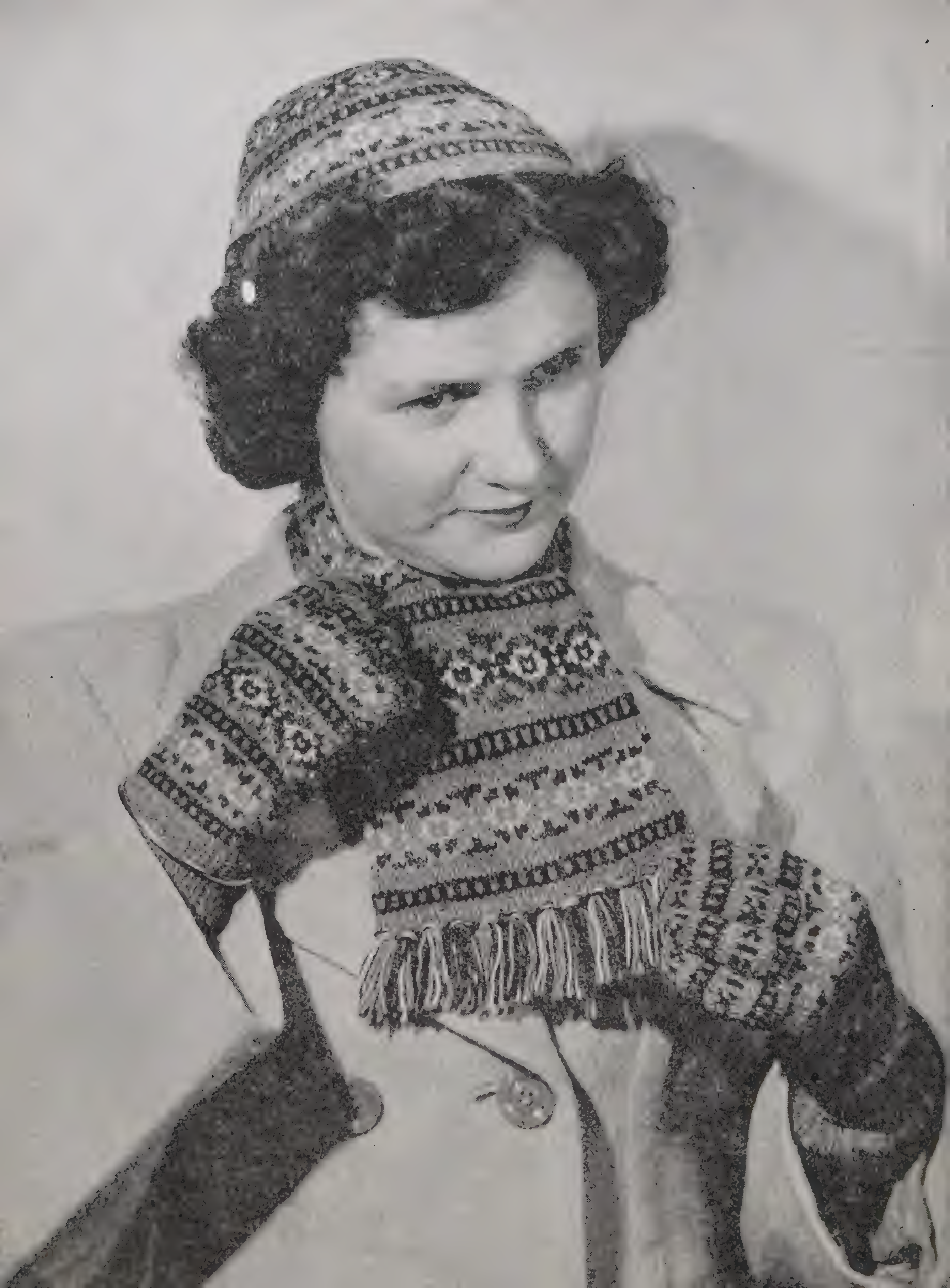
The strangely-distorted, spongy fruits caused by bladder-plum disease on a Japanese plum.

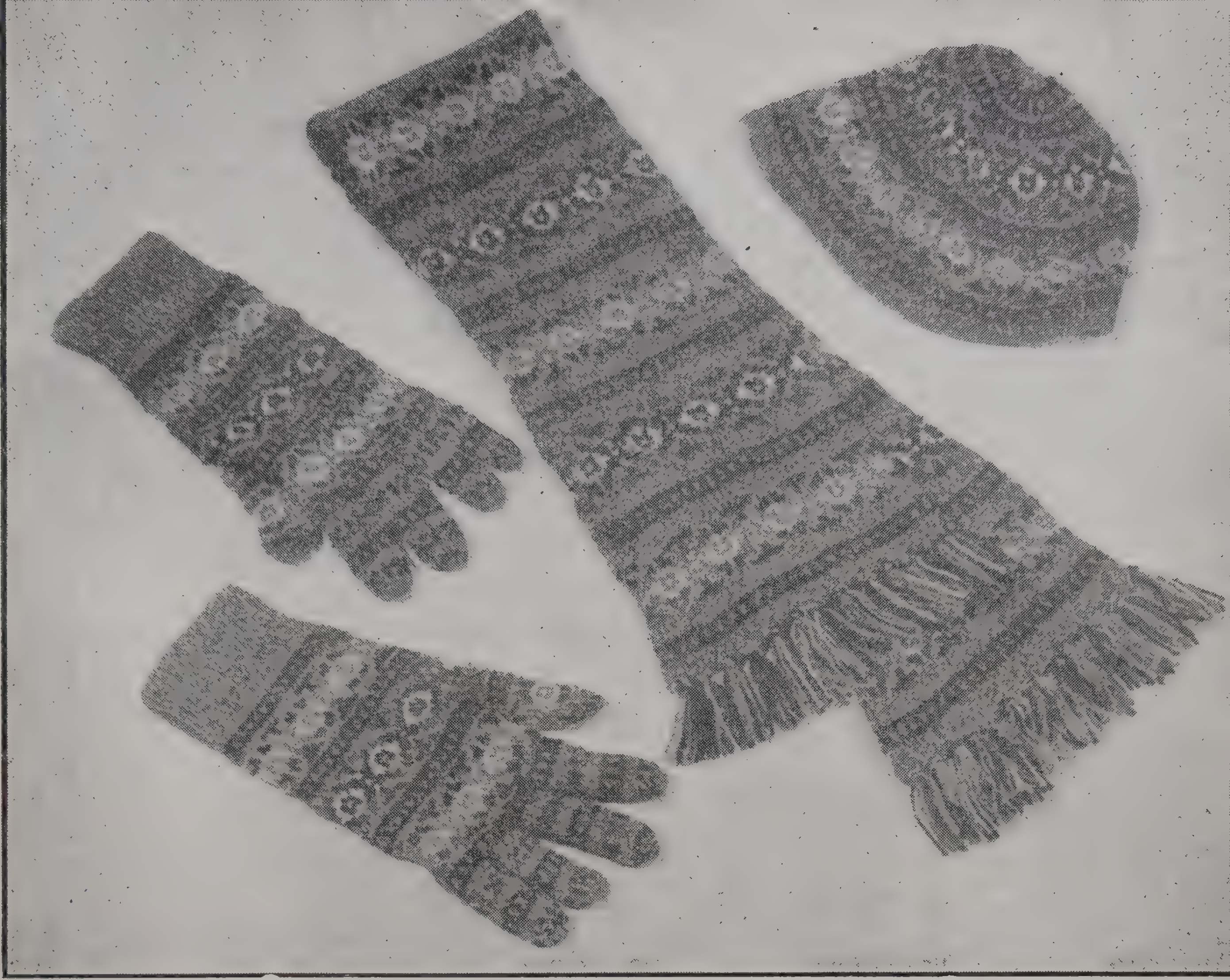
Slugs and snails can do a great deal of harm at this time of the year, especially to young plants and seedlings, and the wise gardener declares war on them as soon as the first traces of their tell-tale slimy trail are seen. There are various effective ways of killing slugs and snails, including searching for them with a torch after dark or keeping a "tame" hedgehog, but the most convenient way is to use one of the poison baits. These can be mixed at home, following the recipes given, or bought ready mixed from seedsmen.

A chemical known as metaldehyde is extremely poisonous to slugs and snails, which die if their bodies even touch a little of it. It can be bought in the form of oblong white tablets, which should be crushed to powder and mixed with some material attractive to slugs and snails, such as bran or dried blood. Mix the powder of one tablet with a large double handful of the bait and sprinkle the mixture very thinly over the surface of lawns, flower beds, or vegetable garden and especially under hedges and in similar places where slugs and snails love to congregate. One application will usually give excellent control, especially if no rain falls within 24 hours of scattering the mixture. Metaldehyde is not intensely poisonous, like some other compounds such as Paris green, but it should be kept out of the way of children.

A bait of Paris green (poisonous arsenical compound) and bran or other carrier scattered thinly over the garden will also give some control of these pests, but is not usually as effective as metaldehyde bait.

Tulip "breaking" or "stripe" is caused by a virus disease, spread from plant to plant by greenfly. The virus causes the flowers to develop abnormal streaks of colour which completely spoil their appearance. An infected plant never recovers from the disease; though it continues to grow and produce new bulbs, every one of them will be infected and will produce "broken" blooms. Home gardeners or commercial growers who are interested in keeping their tulips free from this common trouble should keep a sharp watch for greenfly and spray the tulips with nicotine at the first sign of their appearance in early spring. In addition to this routine measure, however, the plants should be carefully inspected daily as soon as the flower buds start to show colour, and all plants showing any sign of "breaking" should be dug up carefully, with their bulbs, and burnt.





Cap, Scarf, and Glove Set in the Fair Isle Manner

By EVA TOPPING, *Rural Sociologist, Auckland.*

GENUINE Fair Isle knitting comes from a small island off the north coast of Scotland. The wool is homespun from the fleeces of the hardy island sheep and is dyed by the crofters with natural dyes and mordants derived from lichens, mosses, bark, leaves, and other materials found on the island. The patterns are traditional and are always geometrical. It is said that the designs were taught to the inhabitants of Fair Isle by Spaniards who were shipwrecked on the rugged coast in the time of the Spanish Armada. The colourful and attractive work has enjoyed a great revival of recent years and is much worn as sweaters, cardigans, caps, bonnets, scarves, gloves, and mittens.

THE real Fair Isle patterns are often extremely complicated, but simplified versions in the Fair Isle style have become popular with home knitters, who find the work a fascinating change from the usual one-colour garments. Directions are given for making a cap, gloves, and scarf set which would make a suitable complement for the girl's winter coat illustrated last month.

WEAVING IN

In Fair Isle patterns only two colours are used in any one row; the strand not being knitted is held in the left hand, **behind** the work in the knit row and **in front** in a purl row. Of course when the garment is knitted on four needles the loose wool is always held behind the work. In working, the needle is inserted in the usual way, then under the loose strand, and the stitch completed. For the next stitch the needle is inserted as usual, put **over** the loose strand, and the stitch completed. Many knitters use this method of joining on a fresh ball of wool in ordinary knitting; weaving in for colour knitting is done in exactly the same way.

MATERIALS

For the complete set 8oz. of 3-ply wool are required in the following proportions: 2oz. fawn heather mixture for the ground work; 2oz. brown and 1oz. each of blue, green, yellow, and red. Other colours which harmonise well or which match the flecks in the tweed of a coat can be chosen to suit personal tastes. Rust, orange, yellow, and white with brown and fawn would make an attractive set for wearing with a brown or fawn coat. All the items

SCARF IN FAIR ISLE . . .

are knitted flat, that is on two needles only and stitched together. The cap and scarf require No. 10 needles and the gloves No. 12.

Abbreviations

K. knit; P. purl; tog. together; st. st. stocking stitch; bl. blue; br. brown; gr. green; y. yellow; r. red; f. fawn.

THE SCARF

Measurements

5½ to 6in. wide when made up;
35in. long without fringe.

With No. 10 needles and fawn wool cast on 90 stitches. Work 4 rows in K. 1 P. 1 rib, then 4 rows st. st. Join on brown wool and knit the narrow "filler" pattern.

Narrow Pattern

1st row: Knit in brown to end of row.

2nd row: Purl 1 f., 1 br. to end of row.

3rd row: Knit 1 br., 1 f. to end of row.

4th row: Purl in brown to end of row, break off brown wool.

Work 4 rows st. st. in fawn and then start the wider pattern. Join on the green and brown wools.

1st Pattern

1st row: Knit 3 br., * 5 gr., 5 br., * —Repeat from * to * seven times, 5 gr., 2 br.

2nd row: Purl 3 gr., 1 br., 1 gr., 1 br., 3 gr., 1 br., repeat to end.

3rd row: Knit 1 br., 2 gr., 2 br., 1 gr., 1 br., 2 gr., repeat to end and break off green and brown wools.

4th row: Purl. Join blue and yellow wools: 3 bl., 3 y., 3 bl., 1 y., repeat to end.

5th row: Knit 3 bl., * 1 y., 3 bl., 1 y., 5 bl. *, repeat seven times, 1 y., 3 bl., 1 y., 2 bl.

6th row: Purl 1 bl., 2 y., 1 bl., 1 y., 1 bl., 2 y., 1 bl., 1 y., repeat to end.

7th row: Knit, same as 5th row.

8th row: Purl, same as 4th row. Break off blue and yellow wools.

9th row: Join on green and brown. Knit, same as 3rd row.

10th row: Purl, same as 2nd row.

11th row: Knit, same as 1st row. Break off green and brown wools and join on fawn.

Work 4 rows in fawn in st. st. then repeat the small pattern by working thus:—

1st row: Purl in brown.

2nd row: Knit 1 br., 1 f., to end.

3rd row: Purl 1 f., 1 br., to end.

4th row: Knit in brown.

Work 4 more rows in st. st., break off fawn wool and join on red and blue—repeat the pattern as follows.—

1st row: Purl 2 r., * 5 bl., 5 r. *, repeat seven times, end with 5 bl., 3 r.

2nd row: Knit 1 r., 3 bl., 1 r., 1 bl., 1 r., 3 bl., repeat to end.

3rd row: Purl 2 bl., 2 r., 1 bl., 2 r., 2 bl., 1 r., repeat to end. Break off red and blue wools.

4th row: Join on brown and yellow wools. Knit 1 y., 3 br., 3 y., 3 br., to end.

5th row: Purl 2 br., 1 y., 3br., 1 y., * 5 br., 1 y., 3 br.. 1 y. *, repeat *—* seven times, end with 3 br.

6th row: Knit 1 y., 1 br., 2 y., 1 br., 1 y., 1 br., 2 y., 1 br., repeat to end.

7th row: Purl, same as 5th row.

8th row: Knit, same as 4th row. Break off brown and yellow wools.

9th row: Purl. Join on red and blue and work same as 3rd row.

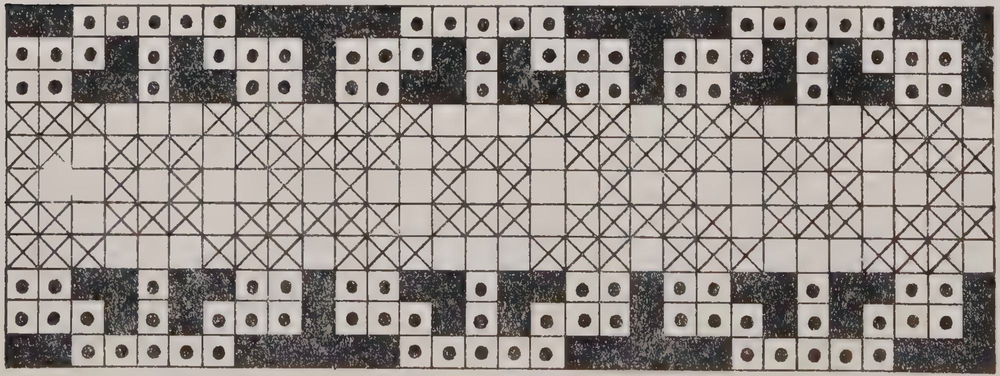
10th row: Knit, same as 2nd row.

11th row: Purl, same as 1st row.

Now work 4 rows in stocking stitch in fawn, and then repeat from first small pattern four times. This will give

MAIN PATTERN FOR CAP, SCARF, AND GLOVES.

Read charts from right to left and from bottom to top.



KEY TO COLOURS

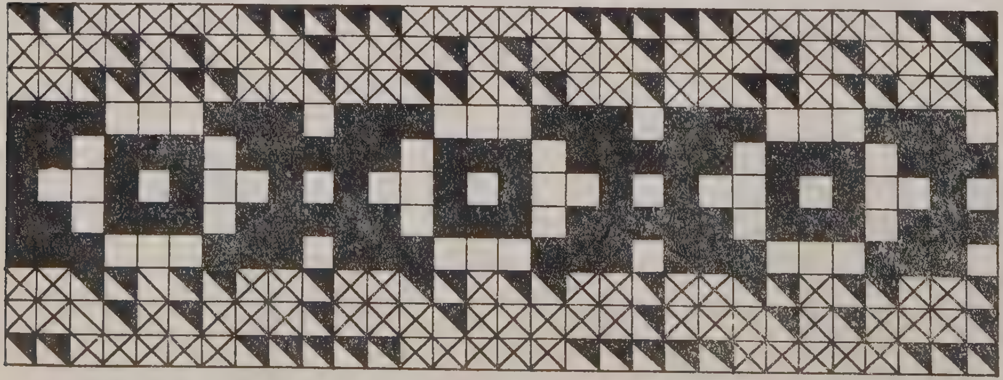
▨ Brown

⊙ Green

☒ Blue

☐ Yellow

FIRST PATTERN.



KEY TO COLOURS

■ Brown

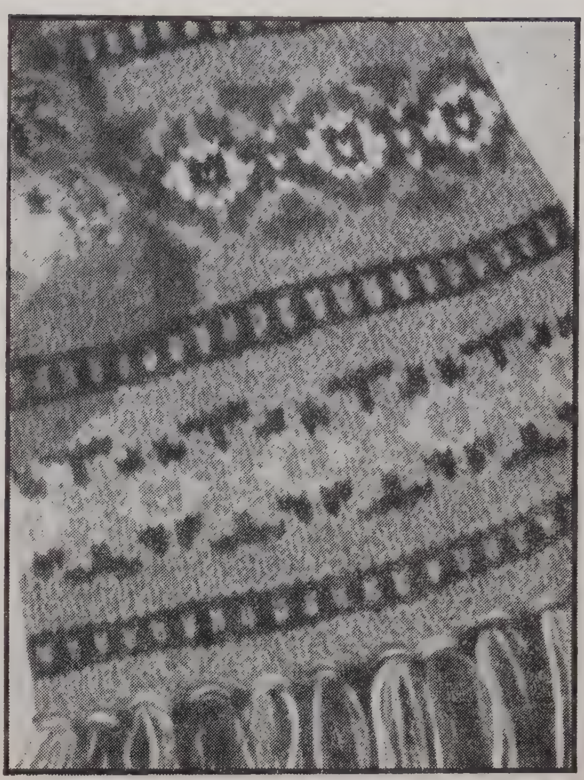
☒ Blue

☐ Yellow

◩ Red

SECOND PATTERN.

FAIR ISLE KNITTED SET



Detail of the scarf pattern.

10 rows of the larger pattern. Next work a smaller pattern, four rows st. st. in fawn and repeat the first large pattern; work four rows st. st., repeat the smaller pattern; work two rows st. st., four rows in K. 1 P. 1 rib and cast off.

TO MAKE UP

Tie loose ends in pairs securely and clip the wool short. Press well with a warm iron over damp cloth. Fold in half lengthwise with the wrong side out and sew the long sides together, taking a stitch in each row on both sides alternately. Press the seam, turn to the right side and lightly press with the seam opposite to the folded edge.

THE FRINGED ENDS

Group the ends of wool from each ball in the hand and wind over a firm card about 2½in. wide. The fringe of the original scarf was wound round a cribbage marker; a similar piece of smooth wood or stiff card would serve the purpose quite well. Keep the strands very even when winding. Cut along one edge, leaving bundles of wool about 5in. long. Take up one bundle, that is one strand of each colour of wool; fold in half. Insert a bone crochet hook through the two edges of the ribbing at the end of the scarf, put the folded loop of wools over, and draw through. Wrap the loose ends over the hook and pull through the loop, making the knot firm at the scarf end; space the bundles of fringe evenly. Do both ends, then shake to straighten the strands and trim even with sharp scissors.

It will be noticed that though the two wide patterns are exactly alike, the rows of knit and purl are reversed; the first pattern starts on a knit row and the second on a purl row, thus reversing the order of the stitches. Those knitters who prefer to work from a chart must remember to start a knit row from the bottom **right** hand corner and a purl row from the bottom **left** hand corner.

By the time the scarf has been completed the worker will be quite familiar with the pattern and can proceed to a shaped article without misgivings.

THE CAP

The cap is knitted on two needles and the join sewn down the back. If the knitting is carefully finished off and the sewing well done, the seam will be practically invisible.

With No. 10 needles and fawn wool cast on 160 stitches.

Knit 4 rows in K. 1, P. 1 ribbing.

Knit 2 rows in st. st., join on brown wool, and knit the first small pattern as in the scarf.

Next 2 rows in st. st. in fawn.

Now start the first wider pattern.

1st Pattern

Break off fawn wool, join brown and green.

1st row: Knit 3 br., * 5 gr., 5 br. *, repeat * to * 14 times, 5 gr., 2 br.

2nd row: Purl 3 gr., 1 br., 1 gr., 1 br., 3 gr., 1 br., repeat to end.

3rd row: Knit 1 br., 2 gr., 2 br., 1 gr., 2 br., 2 gr., repeat to end. Break off gr. and br.

4th row: Join on blue and yellow. Purl 3 bl., 3 y., 3 bl., 1 y., repeat to end.

5th row: Knit 3 bl., * 1 y., 3 bl., 1 y., 5 bl. *, repeat from * to * 14 times, 1 y., 3 bl., 1 y., 2 bl.

6th row: Purl 1 bl., 2 y., 1 bl., 1 y., 1 bl., 2 y., 1 bl., 1 y., repeat to end.

7th row: Knit, same as 5th row.

8th row: Purl, same as 4th row. Break off blue and yellow wools.

9th row: Knit. Join brown and green and work same as 1st row. Break off brown and green wools.

Purl next row in fawn.

Decrease row: Knit (in fawn), K. 2 tog., K. 2, repeat to end (120 sts.). Join on brown wool and work next 4 rows in brown and fawn as narrow pattern; break off brown wool.

Decrease row in fawn. Purl 2 tog., P. 10, repeat to end (110 sts.). Knit next row in fawn. Break off fawn wool, join red and blue, and work next 11 pattern rows in the same way as the second wide pattern on the scarf. Break off the coloured wools and join on the fawn.

Decrease row. In fawn K. 2 tog. twice, K. 1, repeat to end (66 sts.).

Next row: Purl in fawn to end. Join on brown wool and knit next 4 rows in small pattern.

Decrease row: In fawn K. 1, K. 2 tog., repeat to end (44 sts.).

Next row: Purl in fawn to end. Join on brown and knit 4 rows in narrow pattern. Break off brown wool.

Next row: K. 2 tog., repeat to end.

Last row: Purl 2 tog. to end. Break off a long end of fawn wool, thread a darning needle, and gather up all the loops, finishing off firmly on the wrong side. Press with hot iron and damp cloth, sew up the seam, and lightly press again.

Notice that the first wide pattern on the cap is curtailed; the 9th and 10th rows of the first pattern of the scarf are omitted, and the 11th scarf pattern row becomes the 9th pattern row in the cap.

GLOVES

Left Hand

Cast on 48 stitches on No. 12 needles. Rib 1 and 1 for 2in.

Increase row in fawn.

Knit. Inc. 1 in 1st st., * K. 4, inc. in next st. *, repeat from * to * until 2 sts. left, K. 2 (58 sts.).

Purl 1 row brown.

Knit 1 fawn, 1 brown.

GLOVES IN FAIR ISLE . . .

Purl 1 brown, 1 fawn.

Knit brown.

Purl fawn. Break off fawn wool, join on green and brown. Pattern starts here and also the increases for thumb.

Pattern

1st row: Knit 2 br., * 5 gr., 5 br. *, repeat * to * once, increase in next st. in gr., K. 2 gr., inc. in next st. by knitting in front in gr. (giving 5 gr. sts.) and back in br. K. 4 br., * 5 gr., 5 br. *, repeat * to * once, 5 gr., 3 br. (60 sts.).

2nd row: Purl 1 br., 3 gr., 1 br., 1 gr., 1 br., 3 gr., repeat to end.

3rd row: Knit 2 gr., 2 br., 1 gr., 2 br., 2 gr.. 1 br., repeat to end. Change wools to blue and yellow.

4th row: Purl 1 y., 3 bl., 3 y., 3 bl., repeat to end.

5th row: Knit 2 bl., * 1 y., 3 bl., 1 y., 5 bl. *, repeat * to * ending with 3 bl. (instead of 5 bl.).

6th row: Purl 1 y., 1 bl., 2 y., 1 bl., 1 y., 1 bl., 2 y., 1 bl., repeat to end.

7th row: Knit, repeat 5th row.

8th row: Purl, repeat 4th row. Break off blue and yellow and join in green and brown.

9th row: (With increase for thumb pattern.) * 2 gr., 2 br., 1 gr., 2 br., 2 gr., 1 br. *, repeat * to * once, 1 gr., 1 gr. in front of next st., 1 br. in back of same st., 2 br. (3 br. altogether), 1 gr., 2 br., 1 br. in front of next st., 1 gr., in back same st., 1 gr., 1 br., * 2 gr., 2 br., 1 gr., 2 br., 2 gr., 1 br. *, repeat * to * twice (62 stitches).

10th row: Purl * 1 br., 3 gr., 1 br., 1 gr., 1 br., 3 gr. *, repeat * to * twice, 1 br., 3 gr., 2 br., 1 gr., 2 br., 3 gr., * 1 br., 3 gr., 1 br., 1 gr., 1 br., 3 gr. *, repeat * to * once.

11th row: Knit 2 br., * 5 gr., 5 br. *, repeat * to * once, 7 gr., * 5 br., 5 gr. *, repeat * to * twice, 3 br. Break off brown and green wools and join fawn.

12th row: Purl all fawn.

13th row: Knit in brown 22 sts., increase in next st., K. 6, increase in next st., K. 32 (64 stitches).

14th row: Purl 1 f., 1 br., to end.

15th row: Knit 1 br., 1 f., to end.

16th row: Purl all brown. Break off brown wool.

17th row: With fawn wool, K. 22, increase in next st., K. 8, increase in next st., K. 32 (66 sts.). Break off fawn wool.

18th row: Join on red and blue wools. Purl 3 r., * 5 bl., 5 r. *, repeat * to * twice, 4 bl., 3 r., 4 bl., * 5 r., 5 bl. *, repeat * to * once, 2 r.

19th row: Knit * 3 bl., 1 r., 1 bl., 1 r., 3 bl., 1 r. *, repeat * to * once, 2 bl., 1 r., 2 bl., 5 r., 2 bl., 2 r., 1 bl., 1 r., * 3 bl., 1 r., 1 bl., 1 r., 3 bl., 1 r. *, repeat * to * twice.

20th row: Purl * 1 r., 2 bl., 2 r., 1 bl., 2 r., 2 bl. *, repeat * to * twice, 1 r., 4 bl., 3 r., 1 bl., 3 r., 4 bl., * 1 r., 2 bl., 2 r., 1 bl., 2 r., 2 bl. *, repeat * to * once. Break off red and blue wools.

21st row: Knit. Join on brown and yellow wools. Increase row for thumb pattern. * 3 br., 3 y., 3 br., 1 y. *, repeat * to * once, 2 br., increase in next stitch in brown, making 4 br. sts., 3 y., 3 br., 3 y., 1 br., increase in next st. in br., 1 br. (making 4 br.), 1 y., * 3 br., 3 y., 3 br., 1 y. *, repeat * to * twice (68 sts.).

22nd row: Purl 3 br., * 1 y., 3 br., 1 y., 5 br. *, repeat * to * once, 1 y., 3 br., 1 y., 6 br., 3 y., 2 br., 1 y., 2 br., 3 y., 1 br., * 5 br., 1 y., 3 br., 1 y. *, repeat * to * once, 2 br.

23rd row; Knit * 1 br., 2 y., 1 br., 1 y., 1 br., 2 y., 1 br., 1 y. *, repeat * to * once, 1 br., 1 y., 1 br., 2 y., 2 br., 3 y., 2 br., 2 y., 3 br., 1 y., * 1 br., 2 y., 1 br., 1 y., 1 br., 2 y., 1 br., 1 y. *, repeat * to * twice.

24th row: Purl 3 br., * 1 y., 3 br., 1 y., 5 br. *, repeat * to * once, 1 y., 3 br., 1 y., 6 br., 3 y., 2 br., 1 y., 2 br., 3 y., 1 br., * 5 br., 1 y., 3 br., 1 y *, repeat * to * once, 2 br.

25th row: Increase row for thumb pattern. Knit * 3 br., 3 y., 3 br., 1 y. *, repeat * to * once, 2 br., increase in brown, 1 br. (making 5 br.), 3 y., 3 br., 3 y., 2 br., increase in brown, 1 br. (making 5 br. sts. altogether), 1 y., * 3 br., 3 y., 3 br., 1 y. *, repeat * to * twice (70 sts.). Break off brown and yellow wools.

Join in blue and red wools.

26th row: Purl * 1 r., 2 bl., 2 r., 1 bl., 2 r., 2 bl. *, repeat * to * twice, 1 r., 1 bl., 2 r., 3 bl., 3 r., 1 bl., 3 r., 3 bl., 1 r., 2 bl., * 1 r., 2 bl., 2 r., 1 bl., 2 r., 2 bl. *, repeat * to * once.

27th row: Knit * 3 bl., 1 r., 1 bl., 1 r., 3 bl., 1 r. *, repeat * to * once, 2 bl. Slip these 22 stitches on to a safety pin or stitch holder for palm. 2 r., 3 bl., 5 r., 3 bl., 3 r., 1 bl., 1 r., * 3 bl., 1 r., 1 bl., 1 r., 3 bl., 1 r. *, repeat * to * twice. Slip last 32 stitches on to holder for back of hand—break off wool.

Thumb

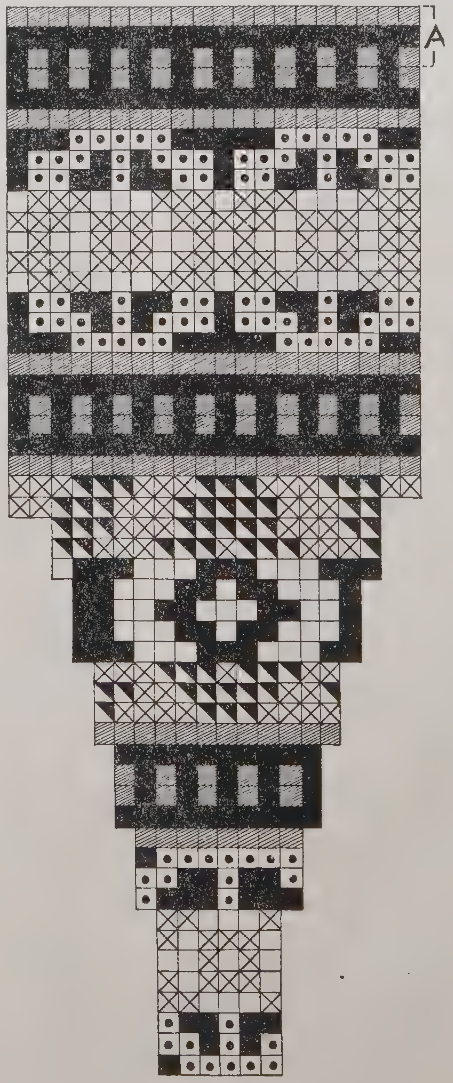
Join on wools on purl side of thumb.

1st row: Purl. Cast on 2 stitches in blue, then purl 2 bl., 3 r., 3 bl., 5 r., 3 bl., 2 r. (18 stitches).

2nd row: Knit. Cast on 2 stitches in blue then knit 2 bl., 3 r., 3 bl., 3 r., 3 bl., 3 r., 3 bl. (20 stitches).

DETAIL OF THUMB PATTERN

Read chart from right to left and from bottom to top.



A—Decreases on these 3 rows. Refer to keys to colours on page 332.

3rd row: Purl in fawn.
4th row: Join on brown wool and knit in brown.
5th row: Purl in 1 f., 1 br.
6th row: Knit 1 br., 1 f.
7th row: Purl in brown.
8th row: Knit in fawn.
9th row: Purl. Join on green and brown wools, 3 br., 5 gr., 5 br., 5 gr., 2 br.
10th row: Knit 3 gr., 1 br., 1 gr., 1 br., 3 gr., 1 br., and repeat once.
11th row: Purl 1 br., 2 gr., 2 br., 1 gr., 2 br., 2 gr., repeat once. Break off brown and green wools.
12th Row: Join on blue and yellow wools. Knit 3 bl., 3 y., 3 bl., 1 y., and repeat once.
13th row: Purl 3 bl., 1 y., 3 bl., 1 y., 5 bl., 1 y., 3 bl., 1 y., 2 bl.
14th row: Knit 1 bl., 2 y., 1 bl., 1 y., 1 bl., 2 y., 1 bl., 1 y., repeat once.
15th row: Purl, same as row 12.
16th row: Knit, same as row 11. Break off blue and yellow wools.
17th row: Purl. Join green and brown wools. Work as row 11.
18th row: Knit, same as row 10.
19th row: Purl, same as row 9. Break off brown and green wools. Join on fawn.
20th row: Knit in fawn.
21st row: Purl in brown.
22nd row: Knit, 1 br., 1 f.
23rd row: Purl 2 tog. in br., 2 tog. in f., to end of row.
24th row: Knit 2 tog. in f., to end of row.

Break off wool and gather sts. tog. with darning needle. Sew thumb seam. Return to outer edge of back; fasten on red and blue wools.

Next row is last of pattern.

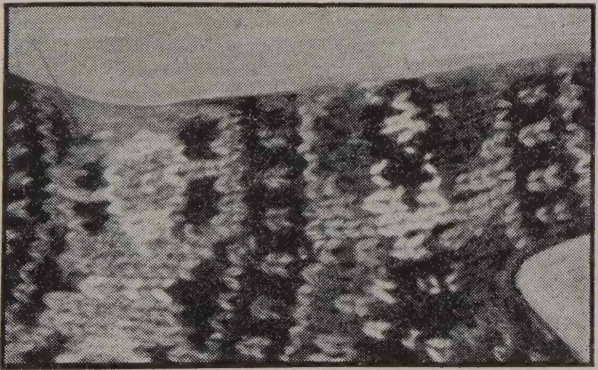
Purl 3 r., 5 bl., 5 r., 5 bl., 5 r., 5 bl., 4 r., pick up 6 sts. from base of thumb thus, 1r., 5 bl., continue 5 r., 5 bl., 5 r., 5 bl, 2 r. (60 sts.).

Next row: Knit to end in fawn.
Next row: Purl to end in brown.
Next row: Knit 1 br., 1 f., to end.
Next row: Purl 1 f., 1 br., to end.
Next row: Knit br., to end.
Next row: Purl f., to end. Break off fawn wool and join on green.

Work next 11 rows in pattern as follows:—

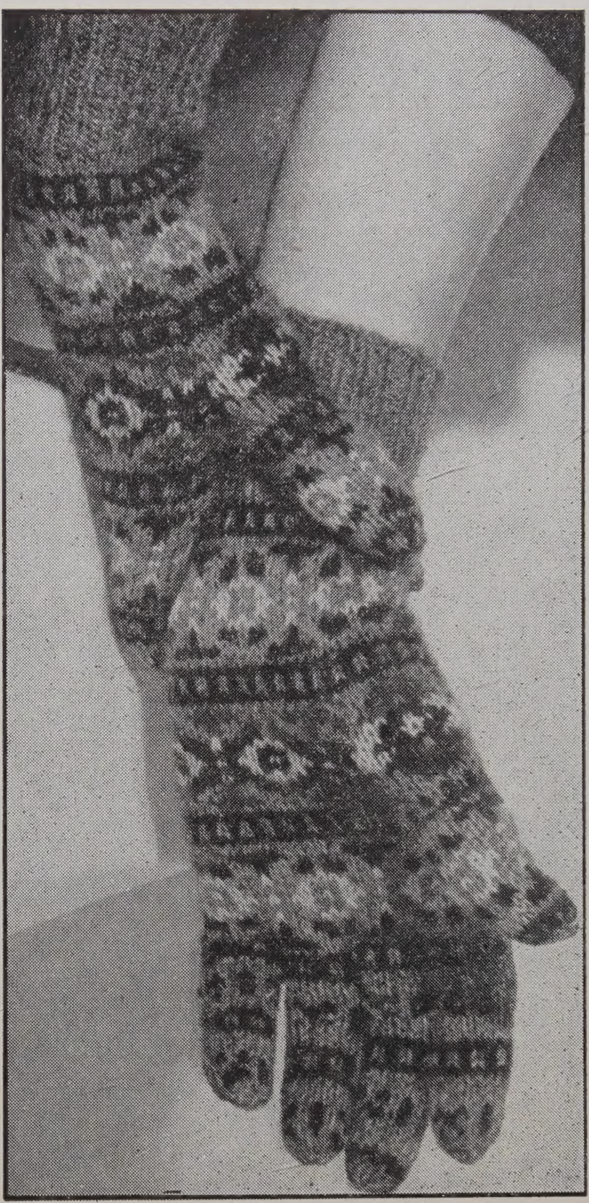
1st pattern row: Knit 2 br., * 5 gr., 5 br. *, repeat 4 times, 5 gr., 3 br.
2nd pattern row: Purl * 1 br., 3 gr., 1 br., 1 gr., 1 br., 3 gr. *, repeat to end.
3rd pattern row: Knit * 2 gr., 2 br.. 1 gr., 2 br., 2 gr., 1 br. *, repeat to end.

Break off brown and green wools. Fasten on blue and yellow.



The alteration of pattern for the thumb.

GLOVES IN FAIR ISLE



The gloves in Fair Isle.

4th pattern row: Purl * 1 y., 3 bl., 3 y., 3 bl. *, repeat to end of row.
5th pattern row: Knit 2 bl., * 1 y., 3 bl., 1 y., 5 bl. *, repeat to end but finishing with 3 bl. instead of 5 bl.
6th pattern row: Purl * 1 y., 1 bl., 2 y., 1 bl., 1 y., 1 bl., 2 y., 1 bl. *, repeat to end.
7th pattern row: Knit, same as pattern row 5.
8th pattern row: Purl, same as pattern row 4. Break off blue and yellow wool. Join on brown and green wools.
9th pattern row: Knit, same as pattern row 3.
10th pattern row: Purl, same as pattern row 2.
11th pattern row: Knit, same as pattern row 1. Break off green and brown wools.
Next row: Join on fawn and purl to end.
Next row: With brown wool, knit to end.

Break off wools. Slip 22 stitches from each end on to holders, leaving 16 stitches for first finger.

GLOVES IN FAIR ISLE . . .

First Finger

Join on brown and fawn wools. Cast on 2 stitches in brown, giving 18 stitches.

1st row: Knit 1 br., 1 f., to end.

2nd row: Purl 1 f., 1 br., to end.

3rd row: Knit in brown to end.

Next 3 rows: St. st. in fawn.

7th row: Knit 1 br., 1 f., to end.

8th row: Purl 2 f., 1 br., to end.

9th row: Knit 1 br., 1 f., to end.

Next 3 rows: St. st. in fawn.

13th row: Knit in brown.

14th row: Purl 1 f., 1 br., to end.

15th row: Knit 1 br., 1 f., to end.

16th row: Purl in brown.

Next 3 rows: St. st. in fawn.

20th row: Purl 1 f., 1 br., to end.

21st row: Knit 1 br., 2 f., to end.

22nd row: Purl 1 f., 1 br., to end.

23rd row: Knit in fawn to end.

24th row: Purl 1, p. 2 tog., to end.

25th row: Knit 1, knit 2 tog., to end. Break off length of wool.

Slip remaining sts. on to darning needle, gather up, and fasten off.

Sew finger seam.

Second Finger

Take 8 sts. from back (on holder), pick up 2 from the base of 1st finger and 8 stitches from palm, making 18 sts. for 2nd finger. Join on brown and fawn wools. Knit as for 1st finger until 22nd row.

Next 3 rows: St. st. in fawn.

26th row: Purl in brown to end.

27th row: Knit 2 tog. in fawn to end.

28th row: Purl 2 tog. in fawn to end.

Finish off and sew seam as for 1st finger.

Third Finger

Take 7 stitches from back, pick up 2 stitches from base of 2nd finger, and 7 stitches from palm, making 16 stitches for 3rd finger. Join the wools and knit as for 1st finger. Finish off and seam.

Fourth Finger

Take remaining 7 stitches from back and 7 from palm, picking up 2 from base of 3rd finger. Knit as for 1st finger until 22nd row, then finish off. Sew seam.

Sew all loose ends in, sew outside seam, and press well under a damp cloth with a hot iron.

Right Hand

Cast on 48 sts. and work as for the left hand until the row before the first wide pattern is reached; then continue as follows:—

Pattern

1st row: Knit 3 br., 5 gr., * 5 br., 5 gr. *, repeat * to * once, 4 br., increase in next st. by knitting in front in br., and in back with gr., 2 gr., inc. in next st. in gr. (5 gr.), * 5 br., 5 gr *, repeat * to * once, 2 br. (60 sts.).

2nd row: Purl 3 gr., 1 br., 1 gr., 1 br., 3 gr., 1 br., repeat to end.

3rd row: Knit 1 br., 2 gr., 2 br., 1 gr., 2 br., 2 gr., repeat to end. Break off brown and green and join on blue and yellow wools.

4th row: Purl 3 bl., 3 y., 3 bl., 1 y., repeat to end.

5th row: Knit 3 bl., * 1 y., 3 bl., 1 y., 5 bl. *, repeat to end finishing with 2 bl. instead of 5 bl.

6th row: Purl 1 bl., 2 y., 1 bl., 1 y., 1 bl., 2 y., 1 bl., 1 y., repeat to end.

7th row: Knit, same as 5th row.

8th row: Purl, same as 4th row. Break off blue and yellow and join on green and brown wools.

9th row: Knit (with increases for thumb pattern): * 1 br., 2 gr., 2 br., 1 gr., 2 br., 2 gr. *, repeat * to * twice, 1 br., 1 gr., 1 gr. in front of next st., 1 br. in back of same st., 2 br., 1 gr., 2 br., 1 br. in front of next st., 1 gr. in back of same st., 1 gr., * 1 br., 2 gr., 2 br., 1 gr., 2 br., 2 gr. *, repeat * to * once (62 sts.).

10th row: Purl * 3 gr., 1 br., 1 gr., 1 br., 3 gr., 1 br. *, repeat * to * once, 3 gr., 2 br., 1 gr., 2 br., 3 gr., 1 br., * 3 gr., 1 br., 1 gr., 1 br., 3 gr., 1 br. *, repeat * to * twice.

11th row: Knit 3 br., * 5 gr., 5 br. *, repeat * to * twice, 7 gr., * 5 br., 5 gr. *, repeat * to * once, 2 br. Break off brown and green wools and join fawn.

12th row: Purl all fawn.

13th row: Knit in brown—Knit 32, inc. in next st., k. 6, inc. in next st., k 22 (64 sts.).

14th row, 15th row, 16th row: Same as 14th, 15th, 16th on left hand.

17th row: With fawn wool K. 32, inc. in next st., k. 8, inc. in next st, k. 22 (66 sts.). Join on red and blue wools.

18th row: Purl, 2 r., * 5 bl., 5 r. *, repeat * to * once, 4 bl., 3 r., 4 bl., * 5 r., 5 bl. *, repeat * to * twice, 3 r.

19th row: Knit * 1 r., 3 bl., 1 r., 1 bl., 1 r., 3 bl. *, repeat * to * twice, 1 r., 1 bl., 2 r., 2 bl., 5 r., 2 bl., 1 r., 2 bl., * 1 r., 3 bl., 1 r., 1 bl., 1 r., 3 bl. *, repeat * to * once.

20th row: Purl * 2 bl., 2 r., 1 bl., 2 r., 2 bl., 1 r. *, repeat * to * once, 4 bl., 3 r., 1 bl., 3 r., 4 bl., 1 r., * 2 bl., 2 r., 1 bl., 2 r., 2 bl., 1 r. *, repeat * to * twice. Break off red and blue and join on brown and yellow wools.

21st row: Increase row for thumb pattern. Knit * 1 y., 3 br., 3 y., 3 br. *, repeat * to * twice, 1 y., 1 br., inc. in next st., in br., 1 br. (4 br. sts. altogether), 3 y., 3 br., 3 y., inc. in next st. in br., 2 br. (4 br. sts. altogether), * 1 y., 3 br., 3 y., 3 br. *, repeat * to * once (68 sts.).

22nd row: Purl 2 br., * 1 y., 3 br., 1 y., 5 br. *, repeat * to * once, 1 br., 3 y., 2 br., 1 y., 2 br., 3 y., 6 br., 1 y., 3 br., 1 y., * 5 br., 1 y., 3 br., 1 y. *, repeat * to * once, 3 br.

23rd row: Knit * 1 y., 1 br., 2 y., 1 br., 1 y., 1 br., 2 y., 1 br. *, repeat * to * twice, 1 y., 3 br., 2 y., 2 br., 3 y., 2 br., 2 y., 1 br., 1 y., 1 br. *, 1 y., 1 br., 2 y., 1 br., 1 y., 1 br., 2 y., 1 br. *, repeat * to * once.

24th row: Purl 2 br., * 1 y., 3 br., 1 y., 5 br. *, repeat * to * once, 1 br., 3 y., 2 br., 1 y., 2 br., 3 y., 6 br., 1 y., 3 br., 1 y., * 5 br., 1 y., 3 br., 1 y. *, repeat once, * to *, 3 br.

25th row: Increase row for thumb pattern. Knit * 1 y., 3 br., 3 y., 3 br. *, repeat * to * twice, 1 y., 1 br., increase in next st. in br., 2 br. (making 5 br. sts. altogether), 3 y., 3 br., 3 y., 1 br., inc. in next st. in br., 2 br. (making 5 br. sts. altogether), * 1 y., 3 br., 3 y., 3 br. *, repeat * to * once. Break off brown and yellow and join on red and blue wools (70 sts.).

26th row: Purl * 2 bl., 2 r., 1 bl., 2 r., 2 bl., 1 r. *, repeat * to * once, 2 bl., 1 r., 3 bl., 3 r., 1 bl., 3 r., 3 bl., 2 r., 1 bl., 1 r., * 2 bl., 2 r., 1 bl., 2 r., 2 bl., 1 r. *, repeat * to * twice.

27th row: Knit * 1 r., 3 bl., 1 r., 1 bl., 1 r., 3 bl. *, repeat twice * to *, 1 r., 1 bl. Slip these 32 sts. on to safety pin for back of hand. Continue thus:—3 r., 3 bl., 5 r., 3 bl., 2 r., 2 bl., * 1 r., 3 bl., 1 r., 1 bl., 1 r., 3 bl. *, repeat * to * once. Slip last 22 sts. on to holder for palm. Rejoin red and blue wools on right side at base of thumb and continue to work as for left-hand thumb, working in knit stitch where the left-hand directions state purl and purl where directions give knit, to keep the pattern correct.

When thumb is knitted, return to back of hand, join on the red and blue wools, and work on **right** side of glove, following the directions for the left glove but substituting knit for purl and vice versa. Sew seams and press the gloves.

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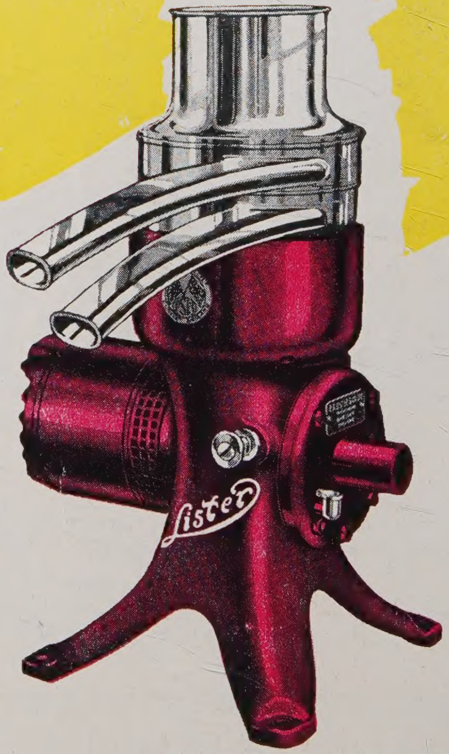

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